February 1990 Vol. 3 Nº 5 Price £1.80

Archive

The Subscription Magazine for Archimedes Users

Machine Code Sorting Routines

Writing RISC-OS Applications

Music on the Archimedes

Using RISC-OS Applications (1) !Paint

Reviews: Jigsaw, Fireball 2, Artisan 2 TechnoScan scanner

Plus: all the regular columns full of information

Growing pains

From the responses on the feedback forms (see page 17 ff), one thing that you seem to value is the personal touch you get when dealing with Archive. It's that 'user group feel' that I have spoken of in the past. It comes partly from the fact that Archive is run by a total of two full-time and three part-time staff and partly from the fact that the articles and reviews are contributed so freely by you, the readers. Archive would die overnight if that support dried up. Do keep the articles and hints & tips coming – they are the life-blood of the magazine.

So what's the problem? The trouble is that Archive is becoming more popular! Despite the fact that we are only using half page black & white adverts in Acorn User et al, new subscriptions are coming in at such a rate that, by the time you read this, we should have reached almost 3,000. That's nothing compared to Risc User's 15,000 subscribers, but it is getting more difficult to give the quality of service that you have come to expect and that we would like to give.

Why don't we take on more staff? It would be an obvious solution but we are rather short of space and also, the larger you get, the more likelihood there is that each of us will not know what the others are doing. The result of that is that you, the customer, end up with a less efficient service.

The answer at the moment is to use some of the spare money to buy equipment (and that includes computerising as much as possible) to speed things up. Our huge new franking machine means that stuffing 3,000 magazines into envelopes in a morning and then franking them, is much speeded up. I have mentioned some other improvements, including the possibility of using Archimedi rather than Macs to prepare the magazine, in the Comment Column.

One thing we have done though, for the sake of the sanity of the over-worked Archive staff, is to say that the phones will be manned from 9 to 1 and from 2 to 5, Monday to Friday. This is a slight reduction in the service we have offered in the past, but anyone who has called at the Archive offices will know just how frought it can get in here and it is important that we don't all end up with nervous breakdowns, so please try to ring within those times. (The fax is available 24 hours, 7 days a week.)

Hope you continue to enjoy reading Archive as much as we enjoy producing it!

With best wishes,

Don't apologise!

I've been told by a number of our subscribers not to keep apologising for my overt Christian stance (see Comment Column). The trouble is that on the one hand I really **don't** want to offend people – and some people are genuinely offended by mentions of religious matters in what they see as inappropriate places – and on the other hand, I have seen so many people's lives (including my own) transformed by 'meeting' Jesus Christ that I can't keep quiet about it.

Watch this space...

Archive

Volume 3 • Nº 5 • February 1990

Contents

Archive magazine is edited by Paul Beverley and published by Norwich Computer Services.

Products Available

• **32M Archimedes for just £7?** – Well, no, don't get too excited – we're talking about a library of routines suitable for linking into programs developed in C which provide up to 32M of virtual memory (assuming you have that much disc space to play with). It is said to be ideal for uses where large quantities of data have to be processed, e.g. image processing. However, moving data to and from virtual memory has to be performed by the routines provided. The cost is £7 from DT Software.

• **A3000 Interface for 5.25" drives** – Dudley Micro Services have designed an interface (price £39.95) specifically for the A3000, for connecting one or more 5.25" (or 3.5") drives to an A3000. They sent us one to look at and it consists of connectors to the p.c.b. and the internal drive linked by a ribbon cable out through the back of the computer to a free-standing plastic box containing the interface. External drives have to be link-selected internally as drives 1 and 2 since the internal drive remains drive 0. A link on the interface allows for older disc drives that do not provide a 'ready' signal.

• **ARM 3 upgrade from Gnome Computers** – These are now available though in rather short supply as they are having difficulty with supply of the ARM3 chips. They cost £495 + VAT direct from Gnome, but they cannot give us any discount until supply improves so they will not be available through Archive just yet. They are cheaper than the Aleph One upgrade, even at Archive discount prices, but we have not had a look at one yet to be able to compare them.

• **BBC software upgraded** – RESOURCE have upgraded many of their BBC titles so that they run on the Archimedes without having to use the BBC emulator and, in some cases, the graphics have been improved: Castle Pack (£21.95), Cateby Manor (£27.50), DIYbase (£27.50), Forge (£38.50), Leisure Unlimited (£29.95), NEA Case Study (£16.50) and Software Tools (£16.50).

• **Caverns** is a new arcade adventure game that has been recently released by Minerva Software. It not only requires flying skill and shooting accuracy but various puzzles must also be solved if the game is to be completed. The game consists of 15 levels, each with a playing area of approximately 16 times the size of the screen. It costs £17.95 inc VAT or £17 through Archive.

• **CraftShop 1 and 2** (£29 + VAT each) are two very impressive new educational packages from 4mation each of which contains two programs. As they say in their blurb, describing them is not easy, so they provide a free demo disc – just send them a blank disc and an S.A.E.

CraftShop 1: **'Patterns'** allows you to use repeated, rotated, reflected, scaled and translated simple shapes to create interesting patterns and pictures. **'Stitching'** – imagine the traditional curve stitching (nail & thread pictures), convert it onto the screen in full colour and extend the idea into 3D with rotation.

CraftShop 2: **'Tiling'** is used with Acorn's !Paint application to create repeated patterns across the screen (sounds a bit dull, but it certainly is not!). **'Embroider'** allows you to create embroidery-like patterns in various colours with ready made 'stitches' or DIY 'stitches' to produce quite fascinating patterns.

All CraftShop designs can be used with JigSaw and also Snippet and Poster when available (see below).

• **DTP Images 1 & 2** are two discs of !Draw line drawings, pixel based !Paint items and video digitised images for £8.99 per disc or £14.99 for the two. Send to G.A.Herdman Educational Software for more details.

• **Educational Software from Northern Micromedia** – Firstly, they have a primary word processor called Stylus. The Mk 1 version of this, which is a conversion of the BBC Micro program, is available now for £15 and Mk 2, which will add dictionary, choice of fonts, etc should be available in summer 1990.

They also do a range of educational programs for various levels: 'All About Me', £11 (age 4+), 'Camping', £15.20 (9-13), 'Crossword Call-up', £12.80 (all ages), 'Funfair' for basic numeracy, £18.80 (7+), 'Pip Goes to the Moon', £12.80 (5+),

'What's It To You' – decision making, £14 (11+) and 'Yellow Brick Road', £16.50 (7-9). (Add VAT to all prices.) We hope to have review copies of some or all of these titles, so if anyone is interested in doing any of the reviews, please write to the Archive Editor and indicate your area of interest and your expertise.

• **Fortran User Interface Development System** – called 'Interacter' from Interactive Software Services is a subroutine library which enables software developers to combine ease of use with portability. There are versions for VAX/VMS, Unix, Prime, IBM PC and Archimedes. Full details from I.S.S.

• **Genesis** – Software Solutions' new educational database is now available in full release form. The prices are £99.99 for non-educational and £69.95 + VAT for education when purchased direct from Software Solutions. The Archive price is £85.

• **Integrex** have inks for their 132 printer that can be printed onto paper and the result transferred to fabric. The final pattern is waterproof. TAP Consortium had some nice pieces of textile printed in this way on show at BETT.

• **Mindwarp** – £14.95 from Future Software is a new shoot-em-up game written by Richard Millican. It consists of over 40 levels, increasing in difficulty. If you are lucky, you may catch a piece of a dying alien craft which can help you in various ways such as extra fire power, speed, lives and so on.

• **Outline Fonts** – Acorn have made their outline fonts available separately as font packs. (They are included in DTP packages but if you can't aford the DTP prices, you may still need the outline fonts.) There is a Font Starter Pack which contains Trinity, Homerton and Corpus for £45 + VAT (£47 through Archive) and a separate New Hall pack, also £45 + VAT (£47). (Acorn DTP at £145 through Archive supplies all these fonts plus Selwyn.)

• **Ram for A410/1** is down in price **yet again**! This time it has dropped to £80 per Mbyte. Also, we are now also selling individual chips at £12 just in case one gets mangled as you are trying to insert it! It is not an easy task to insert the chips without bending the legs as they are the so-called zig-zag chips, not the more common, and sturdier, dual-in-line packages.

• **Spare parts for 310's** – Some of you with the older 310's and 305's are beginning to have worn out mice (call the R.S.P.C.A.!) and worn out disc drives. If you know that they are now defunct and you simply want to replace them, we can supply replacements. The mouse at £55 is just a straight plug-in replacement, but the disc drive obviously needs a bit of technical knowledge to fit it. The old drive has to be removed, the front fascia of the new drive has to be taken off as it is not needed and the drive then has to be mounted into the metal cradle that the old one occupied. You may need to adjust the position of the drive to line it up with the slot in the front fascia, but this should not prove too difficult. At £70 for the drive, it is certainly cheaper than buying Acorn's own replacement drive.

Another alternative is to find someone to repair the existing drive. Bedford Technical Engineering (see Factfile), who are part of Granada Rental and Retail Ltd, will repair the 3.5" drives for £20 plus parts. If the heads are duff, since it would cost more to replace them than buying a new drive, they offer a "service changeover" i.e. a refurbished but guaranteed drive for £45 + VAT.

• **Studio 24 Plus version 2** is available now – £169 inclusive. (Not £149 as originally stated by EMR.) The new version is multi-tasking and adds extra features including DM printouts, midi keyboard remote control and on-screen notation during record and playback. If you have version 1, you can update it by sending the disc back to EMR with a cheque for £71.50 (£69 + £2.50 p&p). The bad news is that EMR say that they will not sell Studio 24 Plus Version 2 to dealers "at the moment" so if you want it straight away, you will have to pay full price direct to EMR.

• **Video overlays on A3000** – Wild Vision have extended their range of genlock and video overlay cards to include the A3000. Chroma 220, 235 and 250 boards at £155, £199 and £355 respectively (+ VAT + carriage) provide a range of hardware options, all in mini-podule format. (Archive prices are £165, £210 and £375.) The three boards are equivalent to the well established Chroma 320, 335 and 345 for the 310 and 400 series machines at £155, £295 and £395 respectively. (£165, £315 and £420 through Archive)

Chromatext software (£39.95 + VAT or £42 through Archive) provides video titling and **XAT video utilities** package (£79 + VAT or £84 through Archive) provides a wide range of software for the video producer including test card, leader clock, realtime clock, horizontal title scroll, etc. Also includes overscan modes for full screen use.

• **Review Software Received...** Apart from reviews already written, we have received review copies of the following software:

Book Binder (Musbury Consultants)

Family Favourites (Minerva)

Caverns (Minerva)

Holed Out Designer (Impact)

Mindwarp (Future Software)

U.I.M. (The Fourth Dimension)

CraftShop 1 and CraftShop 2 (4mation Educational Resources) A

Forthcoming Products

• **8M Archimedes upgrade.** Mike Harrison was wandering round the BETT Show with his prototype 8M dual MEMC upgrade under his coat! These upgrades will be available through Watford Electronics in due course, but not for a few weeks yet.

• **A3000 colour monitor** – Microvitec are producing a "Cub 3000" monitor for the A3000. It is a standard resolution analogue monitor suitable for the Archimedes' wide range of colours. It is physically modelled on the Cub monitors, so popular with BBC Micro owners, but with colours that will tone in with the A3000. It comes in a metal cabinet with a flat top (provding a much safer resting place for mugs of coffee than Acorn's colour monitors!) and the r.r.p. is only £229 + VAT. It will, of course, also work on A310's and A400 series computers. The reason it has been called a 'Cub 3000' is that the main market they are aiming at is the A3000, especially for the education market. They should be available in "about four weeks", they said at the end of January. (We will be stocking them if at all possible but can't give a price until we see what sort of discount we can get.)

• **Acorn** have a new spreadsheet which should be ready in the next few weeks. It was on show at the BETT Show.

• **Arclight** (ray-tracing for Euclid) will cost £50 and should be around sometime in March. There are two other utilities for Euclid on the way. One of which is 'Splice' and is for manually editing Mogul animations. The price for these will be about £30.

• **An Archimedes version of Pendown** will be around 'sometime in the spring'.

• **Careware / Shareware** – There are no new ones this month (we are up to Shareware 18 and Careware 5) but we have several in the pipeline. Karen Dunkley has very kindly agreed to get together some of the downloads from the Archive BBS for publishing and Phil Colmer of Acorn Computers has very kindly agreed to do the same from SID. We have sent him all the existing Share/Careware discs for putting onto SID and he is going to reciprocate.

• **CD-ROM** – Acorn & Next Technology are co-operating on a CD-ROM reader (SCSI device) for around £600 (not including the cost of the SCSI card). Acorn say it is capable of storing 550M. Next Technology can make CD discs to order for less than £300. They say the data transfer rate is 150 kbytes/s sustained, 1.2 Mbyte/s burst, (SCSI card dependent) and that under their CDFS, information can be read from any standard discs. "The first CD-ROM drives with support software will be available from Next Technology and selected Acorn Dealers from March." (See also the Hardware Column on page 22.

• DUST (£30.50 form RESOURCE) is a mathematical and logic adventure – Derek Allen's sequel to Droom. It is designed to be used as the focus of a project in upper primary or lower secondary. Available 'early 1990'.

• **Lego on screen?** Oak Computers are just putting the finishing touches to their 'KiddiCAD' – a 3D building block program which allows kids (of all ages!) to build structures from basic building blocks (including things like windows and doors) looking a little like Lego. The model can be viewed from any angle as it is being built and sets of bricks can be

'glued' together to make new building blocks which can be combined with the existing model.

• **MIDI Sequencer** – Pandora are due to release !Inspiration which is an advanced MIDI sequencing program for use with Archimedes or A3000 that has an Acorn (or compatible) MIDI interface fitted. At its most basic, it allows you to 'play' to and 'record' from a number of MIDI instruments but at £399 + VAT (£395 inclusive through Archive when available) you can imagine that it will offer a lot more. For example, it has dynamic track allocation, colour coded displays, 4-decimal place tempo adjustment. N.B. it is dongle protected. (We look forward to a comparative review at some stage with Studio 24 Plus version 2.)

• **Resource Kit** from RESOURCE, the first parts of which are due for release in February, is a kit of software to support the National Curriculum, comprising text editor, information handling systems, text and graphics layout system, teletype simulation and story-telling environment.

• **Snippet** from 4mation will allow you to cut, paste, load, save and print screens and parts thereof. A general utility for use with other applications.

• **Poster**, also from 4mation, will allow you to make... posters! It will provide borders, curvy text, clip art, fonts, etc. It can import from various sources including !Draw, text and sprites. Both of these are planned for release in 'late spring 1990'.

• **Wordwise Plus in 80 columns!** – Computer Concepts have a new native mode version of Wordwise Plus which, we hope, they will make available soon. It no longer needs an emulator and it gives more free work space (54k free). The screen display is very much faster than earlier versions and it now works in mode 12 – i.e. an 80-column version of Wordwise Plus! Note that it doesn't mean that it is WYSIWIG, just an 80-column editing screen. You still use preview to see the document as it will be printed. The price is just £29 + VAT or £30 through Archive. We have a pre-release version to try out and apart from one or two hiccups, it seems to be working OK. A

Hints & Tips

• ***WIPE with mouse** – In BASIC, *(or at the operating system prompt for that matter. Ed.)* if you have the pointer ON (*POINTER) and do *WIPE *, a mouse pointer appears enabling you to use <select> to delete the file and <menu> or <adjust> to keep the file.

• **Alerion cheat** – For those who have the RISC-OS version of Alerion, you can select the wave you wish to play by pressing the letters <A> to <O> while on the title screen.

• **BASIC Editor bugs** – There is a bug or two in the Basic Editor v1.00 that comes on the Applications Disc 2. If you exactly fill the first line so that the cursor jumps to the next line, and then press return, the screen looks something like this:

```
10 REM This is meant to be right over to the edge
11 C
20 xxxxxxxxxxxx
30 xxxx
```

If you then press the <page down> key, the computer will freeze.

Another bug, whose circumstances cannot be so readily repeated, occurs when pressing the <cursor down> key causing the program to shoot off the top of the screen, and nothing will bring it back again.

Both of these are 'mild' bugs because pressing <reset> followed by typing *BASIC and OLD and EDIT restores everything back to it original state.

• **BASIC first please** – If you want your computer to start up in BASIC instead of the desktop, use *CON. LAN. 4 and then do a <ctrl-break>. This also means that the full computer memory is available to your program. If you go to BASIC with <f12> to get a star command and then typing BASIC, you only get the memory available that has been allocated to the next application under the task display (651516 bytes). The reason for this is that BASIC is being run as the next task within the desktop environment. This can be seen by typing QUIT which will drop you back into the desktop with everything as it was before.

The other way to get the full memory available is to press <shift-ctrl-f12> which will drop you out of the desktop completely, closing all tasks. This drops you into the operating system, so typing BASIC and then QUIT brings you back to the operating system prompt, not into the desktop.

(This is one of those things which, according to Adrian is "obvious", but to those of us who never reads manuals, it is news! So, the next time you discover something which someone else thinks is "obvious", send it in to us as an H&T. Ed.)

• **CTRLing VDU scrolling** – You can use the <scroll lock> key on the Archimedes to stop the computer printing (either to the screen or printer). Another method of doing this is to hold down the <shift> and <ctrl> keys. However, if you just hold the <ctrl> key down then you can slow down the speed of printing to about a 20th of it original speed.

• **Database routine** – If you've written a database in BASIC e.g. an address book, it can be difficult to find a name unless you stick to a format where all entries are in upper case, or lower case apart from the initial letters. This little routine which uses 104 bytes is the solution. As well as accepting upper or lower case it also will accept the character "#" as a single character wildcard .

It is identical to the BASIC command.

```
INSTR(string,substring,start of
    search)
```

Except the variables A%, $B% and $C% are declared before X=USR(code) is called, i.e.

```
$B%="main string"
$C%="substring"
A%=start of search
X=USR(code)
```

There is an example program with the listing.

```
160 DEFPROCass
170 FORopt=0TO3 STEP3
180     P%=code
190     [ OPT opt
200     STMFD R13!,{R1-R12,R14} ;store
                        registers. not R0
210     MOV R5,R0        ;start of search
```

```
220   MOV R0,#0     ;reset R0 (A%) for
                                  return
230   LDRB R7,[R2,#0] ;load R7 with
                     first byte of $C%
240   CMP R7,#13    ;is it a CR?
250   BEQ end       ;i.e. null sub-
                string. exit to BASIC
260
270   .nomatch
280   MOV R4,#0  ;initialise counters
290   MOV R3,#0
300   .nextchar
310   LDRB R6,[R1,R5]  ;get byte of
                                string
320   CMP R6,#13    ;is it CR ie end
                              of string
330   BEQ end       ;if yes, substring
                        not found. exit
340   AND R6,R6,#95    ;AND to ignore
                                  case
350   LDRB R7,[R2,R4] ;first byte of
                              substring
360   CMP R7,#13       ;is it a CR?
370   SUBEQ R0,R5,R3   ;yes i.e. end
                           of substring
380                    ;R5-R3 gives
                     position in string
390   ADDEQ R0,R0,#1   ;plus 1. First
                                char=0
400   BEQ end          ; and exit
410
420   AND R7,R7,#95    ;AND to ignore
                                  case
430   ADD R5,R5,#1     ;increment
              counters for next chars
440   ADD R4,R4,#1
450   CMP R7,#3        ;is it a hash?
                       If so make equal
460   MOVEQ R6,R7
470   CMP R6,R7       ;ARE bytes equal
480   ADDEQ R3,R3,#1   ;yes - get next
                        sub string char
490   BEQ nextchar
500   BNE nomatch      ;no try next
                            string char
510   .end
520   LDMFD R13!,{R1-R12,R15};restore
              registers. R0 has INSTR
530   ]
540 NEXT
550 ENDPROC
```

• **Disappearing menus** – After selecting an option on a menu, the menu disappears. To prevent this: instead of using <select> to select option, use <adjust>, and the menu will then stay on the screen.

• **Drawing with Outline fonts** - If you possess Acorn DTP, you can use the !FontEd public domain program to create !Draw paths of the individual letters. This is done by dragging the character in the main !FontEd window into the !Draw document window. Once transferred, the letter can be manipulated just like any other drawing e.g. rotated, stretched, filled, etc. With a little patience, some very effective titles can be created.

• **DTP memory** – A couple of hints to give extra memory when using Acorn DTP with a 1M machine: load the printer driver first and then quit before entering DTP. Only the modules are used for printing, which are left installed after you quit. Secondly, the use of screen mode 1 uses only 24k of memory and since it is a four colour mode, it gives a better grey scale than Mode 0.

• **E-Type bug** – There is a bug in 'All Tracks' option of E-Type. If you press hard on the brakes when the time reaches 0:01 the program sometimes goes bonkers and when you are placed on the new track, your Trip Score increases.

• **External ST506 drives** – If you add an external hard drive to an old 440 or 310, you may find that the whole system dies completely for no apparent reason. The problem is that if the external drive is powered up before the computer, a small voltage can be produced within the computer so when the power suplly on the computer tries to power up, it sees this voltage, panics and shuts down again! The simple solution is to power up the computer first and then the external drive.

When switching off, work on the "last in, first out" principle and switch off the drive first. This is good practice since, if the drive is left switched on, as the computer powers down, extraneous signals on the drive's data and control lines could conceivably be interpreted as something nasty like, " Please wipe track 0, sector 0" and you end up with a "Bad Free Space Map"! (I'm sure that is Somebody's Law.)

• **Interdictor Cheat** – It is possible to alter your landing pad in Interdictor. Edit StateSave via !Edit.

Go down to the 10th number and alter it. Note that Landing pad 2 is actually Landing pad 1 and so alter the 10th number to a 1 and so on. Also note that there are 7 runways, the 7th being known as the number 6. This might sound confusing but really it's not!

• **Large hard drives on A410/1?** – Someone asked us to find out whether it was possible to put hard drives with more than 8 heads onto an A410/1. All we have been able to find out is that, to get the extra head select line, you need to change links LK12 and LK13. Whether the software will cope, we do not know. If anyone has any success with it, perhaps they would let us know.

• **Virus protection** – If you are passing discs around, especially PD discs, guard yourself against the virus. When you receive or pass on a disc, you run the risk of your machine picking or up a virus or logic bomb.

Passing on files: Format an unused disc and copy only the files you wish to send. Alternatively, wipe the disc (*Wipe * FR~C), copy the files and run my disc wiping program (see below). This is needed because deleting a file does not erase the data on the disc; it just causes the computer to forget about it. The data can be retrieved by anyone with a disc sector editor, so run the program if you want to thoroughly scrub the unused parts of the disc.

Receiving files: Copy across only those files which you need. Try not to use the desktop as some logic bombs can sit in an application's !Boot file and spring out at you when you open their directory viewer.* After copying, the original disc should be cleared by reformatting.

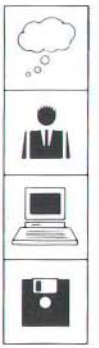
```
 10 REM >Eradicate
 20 REM Guards against the Virus and
          accidental giveaways of data
 30 REM Erases totally the unused parts
                              of a disc
 40 REM PUBLIC DOMAIN by Sandie Goh
 50 REM Version 1.21 (20-Sep-1989)
 60 :
 70 MODE 3:OFF:DIM blankspace 409600
 80 PRINT"Disc Eradicator"
 90 PRINT"================"'
100 PRINT"PUBLIC DOMAIN by Sandie Goh,
          Version 1.21 (20-Sep-1989)"'
110 PRINT"Erases totally the unused
                     parts of a disc."
120 PRINT"HELPS guard against viruses,
                     logic bombs etc."'
130 PRINT"Insert disc to be cleaned in
            drive 0 and press a key."'
140 *FX 15,1
150 IF GET
160 PRINT"Compacting, to collect free
           space into a single block."
170 REPEAT
180   *COMPACT 0
190   SYS"ADFS_FreeSpace","0" TO total,
                                 biggest
200 UNTIL biggest=total
210 PRINT"Saving dummy files into the
    free space to wipe anything there."
220 REM Use unlikely filenames to avoid
                                 clashes
230 IF biggest>409600 THEN
240   OSCLI ("SAVE ZZDelONN12 "+STR$~
                 blankspace+" +64000")
250   biggest=biggest-409600
260 ENDIF
270 OSCLI ("SAVE XXDelONN12 "+STR$~
         blankspace+" +"+STR$~biggest)
280 PRINT"Deleting the dummy files to
                  release the space."'
290 *REMOVE ZZDelONN12
300 *DELETE XXDelONN12
310 PRINT"I now pronounce this disc
                                 clean."
```

*If you don't believe me, I was myself the victim of a booby-trapped disc. After mounting a disc I picked up from a friend, I copied its contents across to my hard disc, only to find that it (the winchester) was now blank! Believing the problem to be a bug in the desktop or chance disc failure, I restored the hard disc and tried again – the same thing happened again, but this time when I did a *Compact 4.

I tried everything and was just about to give up and complain to Acorn when a friend phoned me with the same problem. It turns out that he too had a copy of the disc I had picked up and I immediately became suspicious. Further research showed that the disc contained an invisible program which sat in the machine waiting for an opportune moment, then zapped the Winchester with a *Wipe :4.* FR~C.

The subtlety of the program makes it even more deadly – the "error" occurs when you write to the hard disc using the desktop, so you are lead to think (as I was) that a bug or disc error is responsible. So be warned. Guard against the virus. A

INVESTIGATOR 1.02



£24.95

THE SERIAL PORT

Investigator is a disc utility program which is compatible with the Archimedes 300, 400 and 3000 series using either the Risc OS or Arthur 1.2 operating systems. *Investigator* can perform the following operations on discs of many different formats:

- Examine the format of the disc in detail.
- Edit the data stored on the disc.
- Make backup copies of the disc.
- Store the entire disc as an ordinary ADFS file. This may allow archives of several master discs to be stored on a single backup disc. The disc may then be transmitted to a remote site using a modem and a communications package such as ARCterm.
- Fully WIMP front end.

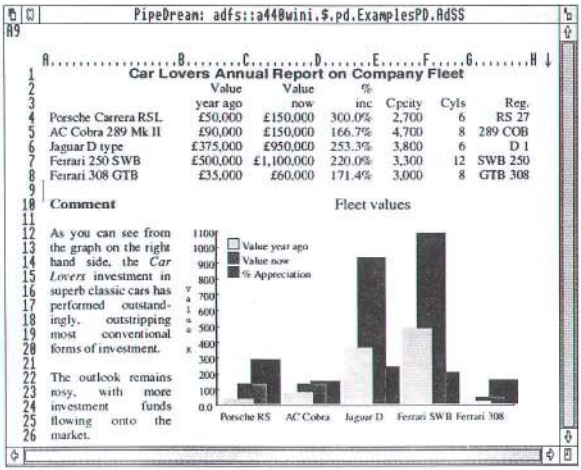
The Serial Port, Burcott Manor, Nr Wells, Somerset BA5 1NH
Voice (0749) 72234 Data (0749) 79794 (300–2400 baud)

Please send me ☐ INVESTIGATOR 1.02 at £24.95, cheque, PO enclosed.
☐ Data Sheet

Name _____

Address _____

PIPEDREAM 3



PipeDream 3 breaks down the barriers between word processor, spreadsheet and database. You can include numerical tables in your letters and reports, add paragraphs to your spreadsheets, and perform calculations within your databases.

Based on PipeDream 2, the best-selling integrated package for the Archimedes, PipeDream 3 has been completely re-written to take full advantage of RISC OS - if you can use RISC OS, you can use PipeDream 3. It is fully multi-tasking and multi-windowing, so you can work on many documents at once and instantly move information between them. And since PipeDream 3 can automatically load and save most popular file formats, including VIEW and First Word Plus, switching to it from other programs has never been easier.

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All trademarks acknowledged. The chart in the screen shown above was produced by sending numbers from PipeDream 3 to Lingenuity's Presenter 2 and then loading the resulting graph back into PipeDream 3.

Colton Software, Broadway House, 149-151 St. Neots Road, Hardwick, Cambridge, CB3 7QJ, England.

Fax. 0954 211607 Tel. 0954 211472

Matters Arising

• **Archive program discs** – Firstly, it's probably not very clear from the Price List what program discs are available and how much they are. There is a single program disc that covers Volume 1 issues 1 to 6 but after that there is one single disc for each month. Each disc costs exactly the same; £3.

Secondly, there has been some criticism that there is not as much on the discs as there used to be. That may well be the case, but to keep life simple, we are not intending to change the prices. The way I look at it, when the disc is 800k full, you get more than your £3 worth. Also, the price of these discs has not changed since Archive first started. They have always been £3. (Matthew 20, verses 1 – 16 may be relevant here.)

• **Backplanes** – If you are buying backplanes for 310's, there are one or two points to note. Firstly, we did say that the Atomwide boards were OK even though they were not four-layer p.c.b.'s as Acorn said were necessary. However, we have found that some of them give problems if the SCSI podule is placed in anything other than slot zero. (Oak say that this is not a problem with high current drain as it might be with, say, a scanner podule, but is more likely to be a problem with RF interference caused by the high speed data transfer. The extra ground plane on the four-layer board would then act as a screen to stop the interference.) This only applies to some of the Atomwide boards and, if you have problems, Atomwide will replace them but it may be worth paying the extra £3 to buy the IFEL four-layer, four-slot board which, as far as we know, does not give problems at all.

The second point relates to the IFEL board. As shipped, they have a piece of conductive foam stuck to the back of the p.c.b. to protect the chips against static damage. It tells you in the instructions to remove this but who reads instructions? It does not actually do any damage to run the board with the foam in place but it is certainly not a good idea!

• **LC10 Colour Dump** – In response to the comments in the review of the LC10 colour dump, Musbury Consultants have added an extra facility to allow multiple passes for individual colours to strengthen the intensity of the printout although, obviously, this increases the time taken to do the printout. If you have an earlier version, you can send it back to Musbury for a free upgrade.

• **Liberator update** – There are several file conversion utilities on the Careware 4 disc, one of which converts from Liberator to PipeDream. Unfortunately, this program contains a bug. Line 150 should read:

```
150 Y%=GET : IF Y%=ASC("*")
    THEN CLS : PROCsys :
    PROCload : ENDPROC ELSE
    OSCLI("Fx 138,0,"+STR$(Y%))
```

• LQdefine problems. (Willie Stott) Under RISC-OS, the format of SYS"OS_ConvertStandard DateAndTime" (SYS &C0 for short) has changed.

Under Arthur, SYS&C0 gave a string of format.

```
22-Nov-1988 20:45:30
```

whereas in RISC-OS it gives

```
20:45:30 22-Nov-1988
```

This affects my program, LQdefine, which some of you may be using. To correct this, the following lines should now read,

```
1170 PRINT LEFT$($time,5)"  "
                  RIGHT$($time,15)
4580 SYS"OS_ConvertStandardDate
     AndTime",timebytes,time,64
                   TO time,R:?R=13
```

In the other version of the program, LQdefineP, the lines are 1280 and 4850 respectively.

Also, RISC-OS has increased the printer buffer to 1023 (Arthur's buffer was 63), so the 63's in the following lines have to be changed to 1023.

```
510 TIME=0:REPEAT:UNTIL TIME>300
                  OR ADVAL(-4)=1023
700 IF ADVAL(-4)<>1023 =TRUE
                        ELSE=FALSE
```

The "63" in line 570 in LQdefineP should also be changed to "1023".

Also, since LQdefineP uses 11k files rather than 8k, I have changed the filetype in LQdefineP to 501.

Steve Hoare's useful interrupt module, Archive 2.6 p.44, disables the printer, thus not allowing SPOOLed files to be loaded into the printer. This is easily remedied by deleting the following lines in the program "IntSrc": 2700,2710,2720,4560,4570 and 4580.

• **Memory loss** – I have seen Gerald Fitton's (and other) explanations of why the amount of memory decreases in size when you open a new application and they're mostly incorrect. Let me try to explain.

When you open a directory viewer onto an application, the Archimedes checks in the Wimp sprite pool (held in the RMA and in ROM) to check if it knows its sprite. If not, it assumes that it is a new, never before seen application and loads its sprite into the RMA portion of the Wimp sprite pool (hence the loss in memory). It also runs the application's !Boot file (if one is present) which usually sets up Alias$@RunType or File$Type aliases which use up further memory. Finally, it uses yet more space to store whether or not the application has a !Help file and, if so, adds a Help option to the Filer's menu.

If no sprites are present, the Archimedes uses the default "application" and "small_app" sprites held in the ROM part of the Sprite Pool.

• **Relocatable Mouse Module** – In answer to Brian Cowan's plea for a module that converts mouse movements into cursor movements (Archive 3.4 p 6), Jona Gebauer of GMA says that their Noah Tools #2 disc contains such a module. Thanks Jona!

• **SCSI drives** (100M & 200M) – I explained last month that we had arranged with Computerware to supply us with 100M and 200M internal and external SCSI drives so that they could be combined with the Oak SCSI podules to keep the price down. To be fair to Oak Computers, who are thereby losing sales, I should explain the difference between the two options.

Firstly, perhaps a minor point, but the Computerware internal drives do not have LED's fitted to show the drive's activity. It is easy enough for anyone with electronics skills to make up an LED on a short bit of twin flex but, to solder it onto the drive, you have to take the drive out of its metal cradle (though not out of its sealed metal box!) which, according to the sticky labels that Computerware have put on the drives, will void the warranty.

Secondly, the drives from Computerware are unformatted (unless I've been feeling keen and have had time to format them for you) and they have not been soak-tested since they left the manufacturer. The reason that the Oak drives are more expensive is that, firstly, they put them on soak test for several hours and secondly, as a result of the soak tests, they reject quite a number of them as not being 100% in various ways – even to the extent of rejecting any which are noisier than usual or which have a longer than normal defect list (which is invisible to the user as they are mapped out within the drive itself).

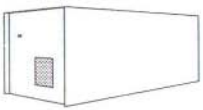
• **Things I take for granted** – There are several things about Archive that I tend to take for granted that newcomers may not understand. The first one that occurs to me is on the Price List. The numbers in brackets after each item are references to the issue and page number where some comments or maybe a review appeared. For example, Genesis from Software Solutions says "3.4.25" i.e. it was referred to in Archive volume 3, issue 4, page 25.

Secondly, also on the Price List, the letters in brackets refer to the various suppliers: (a) = Acorn, (co) = Colton, (m) = Minerva, (cl) = Clares, (s) = Silicon Vision, (d) = Dabs Press, (cc) = Computer Concepts.

SCSI – Another thing I take for granted is the pronunciation of SCSI. I gather the 'received pronunciation' is "scuzzie". A

Contact Box

• **Scottish Archimedes' Owners** – A new group is being formed for Archimedes owners. Anyone wishing to join should contact the secretary: David Davidson, 'Gracemount', 2 Akarit Road, Larbert. Telephone: (0324) 558692. A



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Winchesters and controller card for 300/400/A3000. Exceptionally fast. Up to 7 devices per card. Internal drives come with all necessary mounting hardware. External drives have their own PSU and fan. Please specify if for A3000.

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100Mb	*£1274.00*	*90Mb*	*£1249.00*
200Mb	*£1666.00*	*135Mb*	*£1625.00*
Card only	*£199.00*	*170Mb*	*£1850.00*
A3000 Card	*£199.00*	*330Mb*	*£2845.00*

BBC Winchesters available from £359.00
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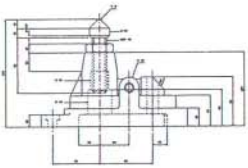
Tel: 0532 502615 Fax: 0532 506868
Also available from all good Acorn Dealers

PDT



Parametric Design Tool. Professional Computer Aided Design. 2D parametric design and modelling system allows designs to be tested, animated and easily modified before being output to an HPGL compatible plotter or via DXF files to other CAD systems or !Draw and then on to DTP etc.

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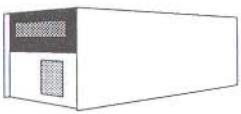
TAPE STREAMERS



Available from mid-December, Oak SCSI Tape Streamers provide the ideal means of backing up data from SCSI or ST506 winchesters, networks or indeed any filing system. Desktop software allows files for backing up to be easily specified, and data can be saved and restored on a file by file basis. Add £100 if you do not have a SCSI card. *p&p £15.00*

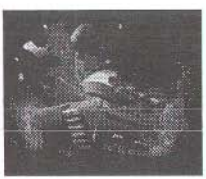
60Mb (per tape) £999.95
150Mb (per tape) £1254.00

Worra Plotter

HPGL plotter driver to allow Drawfiles to be plotted to HPGL plotters. Output may be scaled and sent to ports, network or file.

£29.95 (p&p £4.50)

Worra Battle



Classic Tank Battle Game. Voted best game at the Personal Computer Show by the Guardian. 3D high speed vector graphics.

£14.95 (p&p £4.50)

Worra

All prices exclude VAT

Comment Column

• **Discs in transit** – Quite a few people have taken to sending 3.5" discs in ordinary envelopes without any protection at all. The majority of them get through without being damaged, but quite a few get mangled in the automatic sorting systems of the Royal Mail and arrive in bits in a heat sealed plastic envelope with an apology from RM for having damaged the letter. Putting "Please Do Not Bend" on the outside of the envelope is, with due respect to my Post Office friends, a total waste of time and energy. If the Post Office are going to get the mail through in the time they do (which I think, having experienced post in other countries is generally excellent) they haven't got time to read notes on the envelopes and give the letters special treatment.

The best way to send discs is in a paddy bag – most local Post Offices sell them these days for a few pence. As a second best, if you are going to put them in an ordinary envelope, at least put some card in the envelope. The best thing is to use two pieces of card the same size as the envelope and put the disc in between them so that the letter isn't thin and floppy at one end and fat and stiff at the other which is the worst condition for getting mangled!

• **Minerva's Home Accounts** – One or two readers have told us about a number of problems experienced with Home Accounts. If you are having problems with bugs, don't suffer in silence. Write to Minerva about it and send us a copy of your letter. If no one tells them about the problems, they can't put them right.

• **MultiStore** – Minerva's own Nova Fisher wrote to us about Graham Hobson's review last month in which he looked at the database aspects of Pipedream 3 and presented a first look at MultiStore. Nova was *"somewhat amazed at the comparison as the products are in completely different market place"*. This is true, since Pipedream 3 combines database, spreadsheet and wordprocessor functions in a single package whereas MultiStore is a database management system and is in a different price bracket.

Nova has risen to the challenge in Graham's last paragraph about an accounts package – *"In 1987 we provided a good set of accounts to satisfy the needs in the marketplace. We anticipated that we would need to upgrade this in the future as the Archimedes system stabilised and as users' needs changed. We are pleased to inform you that we are currently working on our new Minerva Accounts products which will be available from the Spring. The new Minerva Accounts may be run as individual modules or as an integrated set of accounts and will not require the purchase of System DeltaPlus. There will obviously be an upgrade path to existing accounts users."* N A Fisher

• **New Archive Members' Database** – We are gradually dragging Archive Magazine's administration into the twentieth century! The database we have used until now for our membership lists has been running on a BBC Master (with a 20M hard drive!) written in Wordwise Plus programming language. We are in the process of transferring it to the Archimedes (running on an Oak 70M SCSI drive for speed) and Adrian has written a custom designed database for it. We decided that it would be too difficult to do it in MultiStore or any other commercially available database since this sort of thing is bound to develop and we wanted to have the flexibility of a home-programmed system. (Come to think of it, it's a very impressive program, so if any of you run subscription magazines or clubs etc, I am sure Adrian Look, who wrote it, would be happy to customise it for you for a suitable fee. Drop him a line at the Archive office if you are interested.)

So, if there are hiccups with your subscriptions, please be patient. There are bound to be some teething problems. (Actually, the number of subscribers seems to have decreased very slightly, so it's a case of, "Hands up all those who are not present!" or at least "Hands up all those who haven't got a copy of this magazine".)

We are hoping to developing, alongside this, a full stock control system so that we can keep a better track of when things are running out. This should help to reduce the number of times we have to tell you that we are out of stock of things.

• **Mac to Archimedes?** – The next stage of our office re-vamp will be to install an Econet system with some sort of shared disc software so that everyone can access data around the network. Then finally we will do away with the Mac's!!!! Yes, I've spoken to Computer Concepts who say they will set up a dummy Archive magazine on Impression so that I can move over straight away without having the time lag (which, with 12 issues a year, we can ill afford) that would be involved in starting again from scratch on a new DTP system. In the meantime, I gather that Human Computer Interfaces can supply a bit of software to link a BBC which is on the Econet onto a Mac which should ease the link between the two and allow us to use the LaserWriter NTII from the Archimedes computers. I'll keep you posted as to how the change-over is going.

• **RISC-OS 3?** – I understand from a recent article in Risc User that Acorn is in the process of writing a new 1M version of RISC-OS. However, it appears that the new ROM set is likely to be available only to 400/1 and A3000 owners. I am sure that many Archimedes 310 owners did not expect that, even though the machine was superseded, Acorn would have failed to support such a large existing user base of A300's. In my innocence, I expected that the support for the machine would have continued. If enough of us complain to Acorn, you never know, they might listen and ensure that future upgrades are available to us. Chris Dawson, Derby. *(See also, comments below about upgrading 310's. Ed.)*

• **Software...** With the advent of RISC-OS and the A3000, software for the Archimedes has just started to appear in volume. The established companies such as Minerva are already supplying very high quality programs, but they are charging the earth for them. Of course, if you've been brought up on PC's and Mac's, you think nothing of paying upwards of £300 for a spreadsheet, but (I think), the majority of Archimedes' owners find most software packages too pricey.

There is, however, a readily available supply of cheap and sometimes very good software in the form of Public Domain. Public Domain programs are written by independent authors and made available either personally or through a distributor. Because neither the author nor the distributor registers a copyright or takes a cut of the profits, PD software can be obtained very cheaply. In fact, some authors even go as far as to give away their programs free!

In the dinosaurian world of the DOS clones, another system of budget software called Shareware (not to be confused with Archive's Shareware which is in fact Public Domain) is in operation.

True Shareware is a "try before you buy" lending library where people pay a nominal fee and receive a copy of the program to test out on their system. They can then either return it or keep the program, in which case an extra charge is incurred. The advantage of this system is that you can try out the program first so you know exactly what you are paying for and whether or not it works on your machine. Shareware is also cheaper than "proper" software.

Your local library should have a list of Public Domain and Shareware programs.

...for the Archimedes?

Public Domain is very big on the Amiga, and (true) Shareware likewise on the PC's, but there is currently very little PD and no Shareware for the Archimedes but let me give you the low-down on three pieces of PD which I think you'll find useful.

If you buy PD, note the version numbers of the programs carefully as it is highly likely that they will be amended by their original author or by other people, and new features may be added or bugs fixed.

!Chars, version 0.15

Characters that have the top-bit set (i.e. 128 to 255) are not normally found on the keyboard but you can enter them by holding down the Alt key while typing in their ASCII codes from the numeric keypad. This, however, is inconvenient as you have to press four keys and remember (or look up) the ASCII code. !Chars, from Acorn, displays the entire extended character set in a window so that you can enter all those foreign accented characters and symbols using the mouse. As it also works with anti-aliased fonts, !Chars is invaluable for Desktop Publishing.

Sources: – Risc User July '89 disc, £4.75 & Acorn SID Database. *(& hopefully, one of the Shaeware discs eventually for £3. Ed.)*

!StickyBD, version 1.10

StickyBD allows you to drag icons out of directory viewers onto the desktop backdrop, where they will stick. You can then load the file icons by double-clicking, without having to wade through a maze of directory viewers first. The program emulates the loading options provided by the desktop filer, so you can open application directories by clicking on them while holding down shift, or drag files into applications and so on.

You can also save the position of the icons to disc and StickyBD will restore them when you next load it. By setting the program to auto-boot (using the Configure option on the menu), StickyBD can install itself and reproduce your carefully-planned icon layout when you open its directory for the first time. You can even load up a background picture – no more boring grey vistas!

!StickyBD 1.10 – Alexander Goh, free provided you send a disc and SAE.

!FormEd, version 1.00

Anyone wanting to write desktop applications had better get !FormEd. Basically, !FormEd is a template file editor, which means that it lets you create windows and icons by clicking with the mouse. No more working out window flags and creating window blocks – just click on !FormEd's icon to create a new window, name it, re-size it with the adjust box, then set its characteristics using FormEd's many menus. A further advantage is that you can edit the window definitions of any program (ADP, Impression, Paint etc).

!FormEd 1.00 – Risc User October '89 disc, £4.75 *(& a forthcoming Shareware disc)*

It is also available from Norwich Computer Services (Archive) for £8 in an improved version written by Adrian Look.

In Corporeas Fidelsa

I'm currently compiling a complete list of Archimedes PD programs which I could publish through Archive (Ed. willing). If you've written any programs you'd like to send out into the big wide world, then place them in the Public Domain and write and tell me about it.

Alexander Goh, 12 Mornington Road, Radlett, Herts, WD7 7BL. (Send a disc and an SAE and you'll get my PD catalogue too.)

• **To upgrade or not to upgrade?** – I have had a go at Acorn Computers about supplying replacement 410 boards to go in 310 computers – perfectly possible to do as far as I can see – just replace the boards and fit a hard disc LED and you have a re-boxed 410/1. The only problem is that Acorn will not allow dealers to sell replacement 410 boards to customers!

Dealers can buy 410 boards for under £xxx (I don't think Acorn would thank me for telling you the price!) but only for repairing 410's – i.e. just in case someone drops a metal spanner on the p.c.b. and blows 90% of the chips. Putting them in 310's would, according to Acorn, cause all sorts of problems with warranties. They also admit that it would upset the 410 market. They are right about that! If we could sell 410 boards for a few hundred pounds (being deliberately vague!) and put in some extra ram at £80/Mbyte, that would be a very attractive proposition for a lot of A310 owners.

After my unofficial enquiries, I wrote to Terry Shurwood, General Manager (Sales), who wrote back very promptly. It was a very pleasant and helpful letter explaining the situation. He said that he had copied my letter to various members of Acorn's management team and indicated that although the issue had been discussed before, he would raise it again at the management meeting at the end of January.

Don't get your hopes too high, though. Terry did say that they felt that "the cost of the upgrade would be, we believe, unacceptably high". What I think that means is that, whilst Acorn would like to be nice to A310 owners, we live in a hard commercial world and it would really not be in Acorn's best interests to provide that upgrade path. In other words, it's not the **cost** of the upgrade that is the problem; it's just that they would have to set the price high to avoid it hitting at the 410 market. We may not like it, but I do think it is an understandable commercial decision.

Any alternative?

We discussed, last month, what would be involved in doing upgrades on your existing 310's and 440's. However, since then, the price of ram for the A410/1 computers has fallen yet again; this time to £80 per Mbyte. It is now becoming an even more attractive

proposition to sell your 310, buy an A410/1 and upgrade it. (This is especially so if you can take advantage of Archive's offer of a free Acorn colour monitor with each 410 purchased. We still have a few left, but please ring before sending in an order just to check if they are still available – the offer applies strictly only while stocks last.) A 410/1 upgraded to 2M and 20M hard drive would cost you £1675 and upgraded to 4M with a 50M drive, just £2120. Compare that to the cost of adding a MEMC1a, a backplane, a podule, a hard disc and a Watford RAM upgrade: 2M plus 20M drive would cost £860 and 4M plus 50M would cost £1375. Assuming you can take advantage of the free monitor offer, you would only have to sell your 310 with its existing monitor for £815 or £745 respectively to break even and end up with a brand new computer which would be somewhat more reliable than an upgraded 310. It has to be worth thinking about.

• **Too low a profile** – One reader, a self confessed "confirmed and totally convinced atheist" writes... I cannot, for the life of me, understand why it should cause offence when a committed Christian should declare himself as such. Quite the contrary, it is generally a welcome sign of a set of values all too rare these days. I may not share your faith, but I applaud your integrity. I like your style and feel that you should not apologise for it.

• **Watford ram upgrades for A310** – Keith Leslie from Kempston, Beds, writes that his experience of fitting the Watford ram upgrades has been very positive and that they were supplied on credit card orders within seven days as were those of his two friends whom he helped to do their upgrades. He found the instructions clear and easy to follow and would recommend the upgrade to others.

Has anyone had any experience of transporting A310's with the Watford upgrade in? One reader said that his worked loose in transit and had to be firmed back into place before it would work. Unfortunately, he didn't say what kind of 'in transit' he was talking about. There's a world of difference between taking it in the back of a car and entrusting it to the Post Office or a carrier service. However, we did a 4M upgrade for one reader and sent it back by carrier and I assume that travelled OK as we have not heard from him.

Readers' Survey

As promised a few issues ago, I read through all the comments that you wrote on your response forms. Many thanks to all of you who made the effort – it was most helpful. Ali typed them all up as they came in and, when I printed them out, there were 56 pages of them! In fact, there were more words than in the whole of one of these issues of Archive!

So, here is a series of observations, in no particular order, based on those comments.

• **Archive index** – One recurring comment was the request for an index for Archive. We produced a printed index of Volume 1 and have decided to do the same for Volume 2. We will put it in with this issue of the magazine if we can get it done in time. However there is already a disc index of all of the issues so far – that is on Shareware 7. Also on the disc is data in Arcscan/Arcscan II format for volumes 1 and 2 of Archive. Has anyone prepared similar data for the beginning of volume 3?

(Shareware 7 used to contain data in Arcscan format about Risc User and Beebug. We thought that it would be a helpful service to those of you who subscribe to both or all three. Unfortunately, Beebug Ltd did not see it in quite the same light. They instructed us to remove the information from the discs saying that it was copyright material. As a result, they have cancelled our series of Careware/ Shareware adverts in Risc User.)

• **SID software** – A lot of people asked if it would be possible to make the programs that are available on SID available to non-modem-owning people (and people who cannot afford huge telephone bills!) The answer is that I have just arranged it with Phil Colmer who runs SID. We have given him all the Careware and Shareware discs, and he is going to send us some discs of SID's stuff. Watch this space...

• **Music, please** – Various people asked for information, articles, reviews and programs to do with music applications. Unfortunately, EMR have never been terribly forthcoming with review copies

of software so we rely mainly on people who have bought their packages for themselves giving us their comments. I sent Armadeus out for review and have not had any response (and can't find my note of who I sent it to! Ooops!) and !Inspiration is not ready yet.

Someone did once offer to run a music column but we seem to have lost contact with him. Any other offers? The trouble is though that an editor is only as good or as prolific as his contributors, so write in and give us the benefit of your experience of the music scene.

• **What do you use your computer for?** – I agree that it would be fascinating to know what Archimedes computers get used for. Have you got any interesting or unusual applications you could tell us about? Write **very briefly** about it and say if you would be prepared to expand your explanation if asked and we will publish the most interesting.

• **More on the basics** – There were lots of requests for articles at a lower level than average to help the beginners catch up. Actually, it is more difficult to write well at that level than to explain some esoteric principle that few would understand anyway. We will try to get articles like that – Karen Dunkley is starting us off this month with !Paint and we are trying to put in more 'obvious' hints & tips such as how to open an application directory without setting off the application by holding down the <shift> button when clicking on the directory icon – you would be amazed at the number of people who change the name of an application directory to remove the "!" just so that they can open it!

• **More comparisons** – True, it would be really useful to have articles that compared and contrasted all the different databases or spreadsheets or scanners or whatever, but there are not many people with enough experience to write such articles. If there is anyone out there who can help us, let us know, please.

• **More on WIMPs** – Another common request has been for more help with programming in the WIMP environment. We have started a series this month which, we hope, will provide some of that information.

• **User groups** – We've been asked to publish a list of Archimedes User Groups. We would love to, but it's up to the groups to write in and announce themselves to us.

• **Hardware projects** – There are still a lot of people interested in interfacing projects for the Archimedes – along the lines of Mike Cook's excellent and extremely long running BBC Body Building series in Micro User. Any offers, anyone?

• **Jargon box** – Here's a good idea! If you don't understand the meaning of any of the technical terms used in Archive or at least are not sure, write in (or fax or mailbox but not by phone, please) and give us a list of the words or phrases and we will start to compile a glossary. We will put the explanations in Archive each month and then, when it gets to a reasonable size, we could make the complete glossary available on Archive BBS and/or on one of the program discs as an Edit file.

• **Abandon the Macs!** – Another recurring question was when were we going to abandon the Apple Macs in favour of something like Impression on the Archimedes. We are thinking seriously about it now and I have already made some comments on this – see page 15.

• **Stop apologising!** – A surprising number of people commented positively on my God-slot comments on the inside front page. It seems as though I have as many supporters as detractors. A number say that I should stop apologising for it – one such comment appears in the Comments Column on page 17. So far only two people have been so offended that they have taken up my offer of cancelling their subscriptions and getting a complete refund – not bad out of nearly 4,000 subscribers.

• **Cartoons** – Someone offered some small computery cartoons, but I can't remember who it was!

• **Disc cataloguer** – Has anyone written a program that would keep a catalogue of the dozens of discs that we so easily accumulate?

• **Multitasking Fortran** – Can you get Fortran Programs to multi-task? Can we have more information about using Fortran on the Archimedes, please? A

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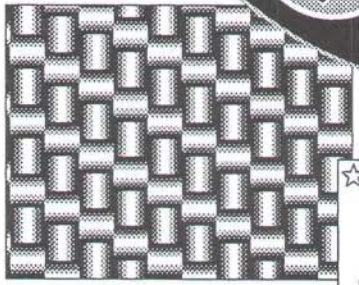

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Hardware Column

Brian Cowan

I went to the BETT exhibition last week specifically to see some new mass storage devices. It looks as though there are some exciting new products available although, as usual, we have to wait a little bit longer for Archimedes' versions to hit the shops. All devices have one thing in common and that is the way that they interface to the computer – they all use the SCSI standard. For A400 series users this means running that interface together with the ST506 which manages the internal Winchester drive. For owners of other machines, where they may be faced with the choice of either an ST506 or an SCSI interface to a hard disc, it looks like the SCSI must be the winner because of its versatility. There will be quite a few different devices that can be connected to this bus and they can be "daisy chained" together, each being accessed by its unique address.

Mega floppies

Last April I read a report that Cumana were bringing out a 5.25" floppy drive for the BBC micros with a disc capacity of 20M. The magazine article showed a photograph of such a drive and I was quite intrigued – it seemed too good to be true. I planned to telephone Cumana to find out about this remarkable product but then I started thinking. 20M is quite a lot for a floppy and the photograph was rather fuzzy and it was the April issue of the magazine. I reluctantly decided it must be an April Fool. I was certainly not going to make a fool of myself and telephone Cumana for details. I was wrong!

The Cumana system

The discs are not actually called floppies. They look like the 3.5" floppy discs, but larger. As with the 3.5" disc, they come in a rigid protective plastic case with a shutter to protect the disc surface. They are called "removable disc cartridges" but essentially they use the familiar floppy disc technology. The head width is substantially smaller and there is a servo system, reading information from the disc, which keeps it spinning concentrically. The discs are removable (although there is a software lock) and this makes for remarkable versatility. In the PC world there have been similar devices available for a few years, called Bernoulli Boxes. However both the Bernoulli drive and media are very much more expensive. The Cumana system has been available for some time in a PC version, where it is starting to make quite a hit. And now there is to be an Archimedes' version.

Capacity

The drives and their discs come in 10M and 20M versions. Unfortunately they are not interchangable so you must decide which you are going to use. I understand the 10M drive will cost about £350 and the 20M version about £650. The 10M discs should sell for about £20 and the 20M discs for about £30. Since the 20M system is not that much more expensive than the 10M version I think that most users will go for the higher capacity systems.

Speed

The performance information on these drives is quite impressive, although not quite as good as a fast Winchester. The average seek time is about 60 ms, which is substantially faster than a normal floppy disc drive and about half as fast as a good hard disc drive. Considering the convenience of having removable discs, this reduction is quite acceptable. I should point out that as yet I have not actually tried out the system, although I hope to do so in the near future. Cumana are planning the release for the Archimedes version "after April". However I understand that the drives are already in use at Acorn where they are being used as the storage device for their SID bulletin board.

Standards

The only reservation one might have about these removable disc systems is in the question of standards – both hardware and software. Will the hardware in its various incarnations catch on? There are (or will be) versions for the BBC, PC, Mac, Nimbus and now the Archimedes. From the hardware point of view these are essentially similar, running through the SCSI interface. The differences are only in the high level and low level software support – the implementation of the filing system. If the hardware does not become popular then owners may find in a few years that they can no

longer obtain discs for their drives (remember 3" floppies?). Also, if the thing is a success then other manufacturers will also produce the discs and prices should fall. So far as I can see, the main competitor is likely to be the 'floptical disc'.

Flopticals

I don't believe this type of drive is available commercially yet but the technology will enable capacities of 20M and above to be stored on what looks like an ordinary 3.5" floppy disc. The read/write mechanism is still the traditional magnetic system but the high storage capacity is obtained by ensuring the disc spins concentrically. In this system this is achieved by having concentric circles printed on the disc which are scanned by a laser-type device coupled to a servo drive.

The main advantage of this system must be the small size of the medium: a disc may be carried in one's pocket, whereas the 5.25" discs are rather unwieldy. Anyway, it will be a year or two before these discs and drives are available so they are not yet a viable option.

CD-ROM

The other product I was eager to see at the BETT exhibition was the CD-ROM system for the Archimedes, launched by Next Technology Corporation. My first impression was surprise at the size of the unit. It was about 2" high, but its width and depth were about the same as a 300/400 series Archimedes case. I was informed that the large size was because the unit contained a fan as well as the SCSI interface and a power supply. The unit should sell for about £600, so this is for serious users only! In some respects I was disappointed in the CD system but in part this was due to my unrealistic expectations. CD's have a long way to go – they have great potential but we are still in the early days.

CD technology

The CD-ROM system uses the same technology as the CD audio disc system. Information is stored in digital form by vaporising holes in a metal film which is securely protected by a clear plastic cover. Capacities in excess of 500M are easily available – quite enormous by any standards. Just consider, a typical 250 page book contains about half a million letters, so without compression it would occupy about half a megabyte of memory. Therefore a CD-ROM of 500M could store one thousand such books! Once you include pictures, however, this changes because the information content of a visual image is so much greater. The same capacity could hold some 5000 photographs, over one minute of TV/video display or over one hour of Hi-Fi sound. Furthermore, all three could be mixed.

Graphics demos

The CD-ROM is the ideal medium for storing graphics (both stationary and mobile) and I saw some quite impressive demonstrations. However on closer examination of what was going on I discovered that the data were being transferred from the CD to the Archimedes hard disc before being displayed. It was explained to me that the CD filing system was not complete yet so that chunks of CD data had to be dumped to the Winchester before being accessed properly.

Software/Publishing

Since the CD mechanism (in this implementation) is fundamentally a read-only system, its utility depends on what software is available. Here I learned a number of new things: production of CD-ROMs is essentially a publishing operation – it is carried out mainly by the traditional book publishers rather than by the established software houses. This means two things: firstly most CD-ROMs produced contain text/picture material rather than software "programs", etc.

Secondly, such CD-ROMs are to be regarded as machine-independent. There are standard formats established for CD data storage such as the ISO 9660 or High Sierra specifications and it is up to the computer manufacturer or CD hardware supplier to provide the necessary software to support this. Things get a little complex however with such things as data bases where the publisher also supplies software for searches, etc which would depend on computer type.

Available CD-ROM material

There is an increasing range of CD material available at quite a wide range of prices. For instance the new Complete Oxford Dictionary (this must almost exhaust the disc's entire 550M of space) will set you back a staggering £500. However for a mere £165

you can obtain ten reference books on a disc, including a dictionary, a thesaurus, a book of quotations and a spelling checker.

Going further down in price but up in value, a copy of the bible is available at £65 (King James' version). This has search and retrieval software which would have to be rewritten for the Archimedes but I am sure it would be a boon in the Archive offices, where an appropriate quotation could be found for all eventualities. The CD medium is ideal for an encyclopedia. I believe that there may be plans to do the Encyclopedia Britannica, which would be very popular if priced sensibly. There is, however, the Grolier Encyclopedia which apparently is popular in the USA. Once again the problem for Archimedes users is the availability of suitable support software. Economic and business data going back many decades could be compiled providing hours of innocent fun for budding "spreadsheet economists".

CD-ROM computer software

Real computer software is a very different proposition from the text-type material discussed above. If we are considering software to run on a computer then it will be specific to the particular machine for which it is produced, which limits the potential market and so increases the price. However, I think that this may well become the software medium of the future. The increased capacity will allow undreamed-of possibilities – integrated software systems, rather than individual programs, will evolve. So we may expect to find combined word processing, database, spreadsheet, DTP, comms and much, much more in a single package. It would be able to include things like full on-line documentation/help facilities, the telephone directory of the entire UK, ordinance survey maps, etc, etc. An integrated mathematics package could include the entire NAG library as well as mathematical databases.

Software protection?

It is possible that the CD medium will provide the ideal protection against pirating. Who will be prepared to copy the disc onto 500 floppy discs? Even then you would probably need to install it in its entirety before using it and who has a spare 500M Winchester available? I think that software producers of even modestly sized programs should consider the CD option – they could easily fill the space with necessary but useless data.

Audio

An unexpected bonus was that the Next Technology CD system for the Archimedes will also play the conventional audio CD's, where output can either go to the small internal computer loudspeaker (remember the 3000 machines have two for stereo!) or to a conventional Hi-Fi amplifier. This facility will be welcome to those who have music CD's or are considering buying a CD player. The only disadvantage is that you would have to have your computer connected and running to control the CD player.

Other SCSI storage devices

Cumana are producing quite a number of storage devices driven by the SCSI bus. They have a tape cassette streamer which uses a high quality version of ordinary audio tape cassettes, a write-once optical disc system and a re-writable optical disc system. Also they produce a CD-ROM system. However none of these have software for running from the Archimedes so I won't discuss them further at present. A

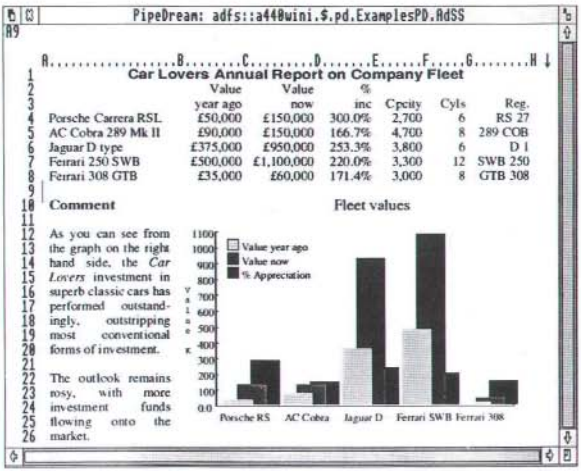
Credit where...

• **Acorn Computers** get an accolade this month. Mr R Glover had a duff drive in his 310 and rang Acorn to ask what he should do. They were able to give him the name and address of a company that would repair it or do a service changeover (see Products Available). The whole process only took a single phone call.

• **Computer Concepts** – I had a couple of pages missing in my Impression manual. I rang Computer Concepts at 3.30 p.m. on Monday. A brand new manual arrived 8.00 a.m. Tuesday! Thanks.

• **IFEL** did a 4M memory upgrade for me (the CJE Micros one) and put in a MEMC1a. My A310 was collected by carrier on Monday lunchtime and returned Wednesday mid morning – less then 48 hours. Excellent service, thanks. Des Woon, Harwich. A

PIPEDREAM 3



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All trademarks acknowledged. The chart in the screen shown above was produced by sending numbers from PipeDream 3 to Lingenuity's Presenter 2 and then loading the resulting graph back into PipeDream 3.

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MS-DOS Column

John Eden

First, a confession, I am afraid I totally underestimated the level of response I was going to get to the upgrade offer I made in December's magazine. So many of you wrote to me that all my spare time seems to have been taken up with copying discs. To those of you who also made technical queries, I apologise if my answers seemed a little terse, but with so many letters to process, I could not spend as much time on each one as I would have liked. Finally, thanks to all those people who sent in contributions for the compatibility list.

While I am on the subject of the compatibility list, I am sure many of you will be pleased to hear that I have completed the new list which now boasts some 120 titles. If you want a copy of this, please send me a stamped, self-addressed envelope with a note to say what it is for. **Please** be patient, as I may not always be able to send the list by return post.

Drivparm & Driver.sys

This month I am going to take a closer look at the drivparm command and how driver.sys relates to it. In fact, drivparm and driver.sys have identical command syntax, although the purpose of each is subtly different. They are both provided to allow control over 'block devices' such as floppy discs and fixed discs and define the way in which these devices are accessed.

Before I look at the commands in detail, a short explanation of the way MS-DOS deals with disc drives is in order. DOS refers to these devices as 'physical' and 'logical' drives; a physical drive is a piece of hardware and a logical drive is a drive profile held in RAM. When you start the emulator (or any PC for that matter) DOS looks around the computer to determine what hardware devices are attached. Any disc drives found are given a physical drive number: the first drive is assigned 0, the second 1 and so on. Fixed discs are assigned numbers starting from 128. Having done this, the config.sys file is read so that any installable device drivers can be assigned. Finally, a logical drive letter is assigned to each physical drive on the system – A to 0, B to 1, etc. However, a machine which has only one floppy drive has both logical drives A and B assigned to it and C is always assigned to the first fixed disc on the system. As you can see, using this method it is possible to assign several logical drives to just one physical drive.

Each logical drive has a drive profile which describes the disc format to be used and since it is only possible to access a physical drive through its assigned logical drive, this will determine how the physical drive is treated. When DOS starts, a default profile is set for all logical drives and in the case of the emulator this is 720k, 80 tracks, 9 sectors and 2 heads. This means that all physical drives connected to the machine will be treated as having this format. In order to access a drive using a different format, the profile will need to be changed and this is where drivparm and driver.sys come into play.

The drivparm command is provided to allow the default drive profile of a logical drive to be changed and any of the standard DOS formats can be set up. In fact, the command is so flexible that it is even possible to set up non-standard formats (although what use this is I don't quite know). The command should be included in your config.sys file and has the syntax:-

```
drivparm=/d:dd/c/f:ff/h:hh/n/
    s:ss/t:tt
```

dd should be replaced with the drive number of the physical drive you are altering.

c is optional and should be included if the drive can detect when a disc has been changed.

ff is a number representing the device type as follows:

/f:0 5.25" 320/360K floppy disc
/f:1 5.25" 1.2MB floppy disc
/f:2 3.5" 720K floppy disc
/f:5 Fixed disc
/f:7 3.5" 1.44MB floppy disc

(Note that the Archimedes 1772 disc controller can't emulate the quad density required for 1.2 and 1.44MB formats, so trying to set these will give an error.)

hh is the number of heads (range 1 to 99).

n is optional and specifies that the device is not removable (i.e. a fixed disc)

ss the number of sectors per track (range 1 to 99).

tt the number of tracks per side (range 1 to 99).

If, for instance, you have connected a 5.25" floppy drive to your machine which you want to access as a 360K drive you would need to put the following command in your config.sys file:

```
drivparm=/d:1/f:0/h:2/s:9/t:40
```

This assumes that the 5.25" drive is connected as physical drive 1 and changes are therefore made to the default profile of logical drive B which was assigned to drive 1 by DOS on start up. Working through the command we can see that the characteristics of the drive are implicitly set as a 360k, 5.25" drive with 2 heads, 9 sectors per track and 40 tracks per side. This now becomes the default profile used whenever drive B is accessed for read/write and format operations. There is a slight contradiction here in that discs of a different format to that defined may still be read on this drive. This is because the floppy disc contains a description of its format as part of the boot record and if DOS fails to read the disc using the defined profile, it uses the profile in the boot record instead.

Driver.sys is a device driver and this is provided to allow extra logical drives to be attached to a physical drive. As I have already said, the command syntax is identical to that of drivparm and the driver should be included in your config.sys file in the following way:-

```
device=driver.sys/d:dd/c/f:ff/
    h:hh/n/s:ss/t:tt
```

You will need to include the full path name of driver.sys if it is not in the root directory. The command differs from drivparm in that it assigns new logical drives to a physical drive and if you were to give the same parameters as those in the drivparm example, you would find that logical drive B is not altered at all. Instead, DOS will set up the 360k format on a new logical drive and assign it to physical drive 1. Finally DOS will tell you which drive letter to use to access the drive with this new format.

It is possible in this way to assign several logical drives, each with different characteristics, to just one physical drive. Using the different formats is then just a matter of accessing the drive with the appropriate logical drive letter! It is also possible to set up two logical drives with the same profile on one physical drive and this would then allow you to copy discs of the same format using just one drive. This is exactly what DOS does on systems that have only a single floppy drive.

Readers' Comments

Firstly a short but useful batch file from Denis Howlett: A little tip you might like is an implementation of grep using the DOS find command in a BAT file:-

```
grep.bat
echo off for
i in (%2) do find %1
i
```

This can then be used as: grep <string> <filespec> where string is any string in double quotes (it doesn't do regular expressions) and filespec can be any wildcard file name e.g. *.TXT. Obviously, it is fairly limited since it won't do subdirectories or wildcard strings but for a couple of lines it is a useful tool. There are a number of switches available on FIND which control what happens:

/V display all lines that don't use the string.

/C for each file, display the number of lines that contain the string.

/N display the line number and text.

Two problems

Next, can anyone help Hugh Eagle with the following problems? (If you can, drop me a line at the usual address and I will include your suggestions in the column.)

1) Do you know of any software routine to turn the Num Lock on? The PC I use at work boots up with Num Lock on but the Archimedes doesn't. Obviously it is easy to press the Num Lock key but it is equally easy to forget. What I need is something to include in the boot sequence that will turn it on automatically. I thought I had found the answer by using a short routine to poke the relevant bit in location H417 (which I gather is the keyboard status byte). Although this did just what I wanted on the

machine at work, on the Archimedes it made the cursor keys generate numbers as well as the numeric key-pad keys (and didn't turn the Num Lock light on).

2) I get prompted to "Press a key" after the emulator has loaded but before booting MS-DOS. This seems unnecessary with a hard disc. Can it be avoided?

Contact

Keep sending me your letters, ideas and suggestions. The address as always is: John Eden, 13 Cranleigh Gardens, Luton, Beds. LU3 1LS (no phone calls please). If you prefer you can write to me care of Archive. Don't forget to include a stamped, self-addressed envelope if you want a reply. A

Jigsaw from 4mation

Alan Highet

Jigsaw is exactly what it says. It is a program which takes a full screen or sprite in any mode and turns it into a jigsaw with a varying number of pieces.

The program installs itself on the icon bar and multi-tasks, although when it is running it requires at least 640k and takes over the whole screen. So to all intents and purposes, it is a single task, certainly on a 1M machine. The program needs to run in mode 15 but will accept pictures in any mode which it then converts, and in the case of sprites, rescales to a full screen. Dragging a picture or sprite to the Jigsaw icon causes a window to open, displaying the chosen picture with three boxes underneath. These allow you to load a previously saved but unfinished jigsaw or turn the picture you have chosen into a jigsaw. There is also a box to allow you to set the level of difficulty. The levels are divided into six sets of four. Three factors determine the levels and these are (1) the number of pieces, (2) whether or not the completed picture can be seen (3) whether or not the pieces are the right way up.

The number of pieces may be 12, 20, 32, 48, 80 or 120. Although 120 doesn't sound many believe me when I say it's plenty! By selecting the appropriate level number from a table any variation of these factors may be used.

On clicking <select> on the New Jigsaw box, the screen clears while the picture is 'cut' up and then shuffled which takes a little time but the hourglass appears with a percentage count of the time taken.

When it has finished you are presented with the screen divided into three. The top half shows you the pieces while the bottom half is the working area. The left half of the working area either shows the piece you are pointing at in the top window or by pointing at the window itself you can see the finished picture if available. The right hand side of the working area shows the working jigsaw with any pieces in place. To select a piece you click on it in the top window with <select> and a box appears round it. Each piece is just like a jigsaw piece with proper interlocking shapes and may be rotated and placed on a full size working screen. Every conceivable situation seems to have been thought of, including the ability to pick up a previously placed piece and return it to the pack.

There are two things I have found that are different from a conventional jigsaw. The first is the need to start from the edge, as you cannot just slide the pieces over if you need more space, instead you have to move each piece individually. The second is that if your piece is in nearly the right spot it will jump to the right place when you press <select>. This is very useful to check if you are right as some of the pieces will fit in the wrong spaces just as with a real jigsaw.

I really cannot fault this program as it does everything it should do and does it in a very slick and easy way. The program comes with 15 superb screens by Rodney Matthews and David Cowell and is well worth buying just for these! There is a 17 page handbook which covers every single thing you need to know including networking instructions.

4Mation say that they have decided to concentrate on pure Archimedes' software and that this program is the first of a carefully planned range. All I can say is that I look forward eagerly to their next release, Craftshop. *(I have seen CraftShop 1 and 2 and they are very impressive. Ed.)*

Jigsaw is available from 4mation Educational Resources for £29+VAT or through Archive at £30 inclusive. A

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Machine Code Sorting Routines

William Stott & Ian Smith

In response to our plea for machine code sorting routines, both Willie Stott and Ian Smith have, independently, sent in contributions. I feel that they are complimentary and so here they are. Willie Stott starts us off...

Having recently got to grips with ARM code, as an exercise, a friend asked me to write a sort routine for him. This is the result – it may not the best example of coding but it does the job.

The program was converted from BASIC to ARM code and I have tried to show how easily conversions can be done, by putting the BASIC as REM statements into the assembler.

It is very fast, typically sorting 8000 strings in around 10 – 11 secs, compared with 9 secs, using RISC-OS's Heapsort, which only moves the pointers. It can also sort from anywhere in the string, is case insensitive (if you want), and just uses 232 bytes once assembled.

There are however some conditions:

1. The strings must be Indirection Strings i.e. $A and not A$(),
2. They must also all be the same length of X*4 including the carriage return, where X is any integer up to 64. This is because the SWAPping of strings is done a word (4 bytes) at a time (lines 920 & 930). It is possible to use single byte in the swap, but it is much slower.

There are advantages to using indirection strings,

1. It can use less memory; BASIC uses 5 bytes for storing addresses. Indirection uses none.
2. The strings are *SAVEd, faster than PRINT#ing them.

The sort works from the second string (string 1) to the end of strings but does not include the first string (string zero). This is due to the original Shell-Metzner routine. If used in a database, string zero can be used to store information; field-names, date of saving etc.

The program was based on the following BASIC Shell-Metzner routine

```
1300 REM Shell-Metzner sort algorithm
                                in BASIC
1310 REM Numstr is number of strings
                             to be sorted
1320 M%=Numstr
1330 M%=INT(M%/2):IFM%=0 THEN GOTO
                                    1400
1340 J%=1 :K%=Numstr-M%
1350 I%=J%
1360 L%=I%+M%
1370 IF A$(I%)>A$(L%) THEN SWAP
              A$(I%),A$(L%):I%=I%-M%
              :IFI%>0 THEN GOTO 1360
1380 J%=J%+1 :IF J%>K% THEN GOTO 1330
                        ELSE GOTO 1350
1390 REM  GOTO 1350
1400 ENDPROC
```

The GOTO's are the original program and have nothing to do with me! The only alterations I made were to use integer variables, use SWAP in line 1300 and use ELSE GOTO 1350 in line 1380. The latter was done in order to make how the conversion was done, easier to understand.

This BASIC program is surprisingly fast, sorting 1000 strings in 14 seconds. How it works I leave up to you to work out; all I did was convert it to ARM code.

Converting to ARM code

The first thing was to pass the address, string length, number of strings and start point of the sort from BASIC.

R0 or A% is the address of the start of string storage

R1 or B% is the length of the string

R2 or C% is the number of strings (Numstr)

R3 or D% is the start point of the sort (1st char = 0)

In converting the BASIC routine, the first thing I did was designate all the variable names to registers:

M% = R4, J% = R5, K% = R6, I% = R7, L% = R8

It was then just a matter of writing the appropriate code, with jumps to compare and swap subroutines.

As BASIC passed four registers which are used throughout the program and there were several

registers needed during the program, it was necessary to use registers R0 to R10. It would be possible to stick to eight registers but this slows up the sort considerably.

Before going to the assembler version of line 1380, registers 4, 5 and 6 are pushed on the stack.

```
1380 J%=J% + 1: IF J% > K% THEN
     GOTO 1330 ELSE GOTO 1350
```

This caused a minor problem in pulling off the stack since, in the BASIC program, there are two GOTO's, hence two stack pulls and two return points.

In both compare and swap routines, it was necessary to find the address of the strings. In BASIC this would be found by

```
Address = StartAddr + (StringNumber
                       * StringLength)
```

In ARM code this was no different:

```
R5 = R0 + R7 * R1
```

and `R6 = R0 + R8 * R1`

where R7 and R8 are the string numbers, R2 is the length and R0 is the start address of storage.

I found that it was quicker to re-calculate the addresses rather than storing and retrieving them.

The compare is done a character at a time, checking for a Carriage Return (ASCII 13) before ANDing with 95 (&9F) which strips the case off the character. (This ANDing can be removed if you wish to use a case sensitive sort.)

The bytes are then compared and if the first is greater than the second, a string swap is done. If they are equal, the next character is obtained and so on until we reach the carriage return. At this point the strings must be identical, so we continue with the next strings.

As long as alpha-numeric characters are used there is no problem with ANDing with 95, but some other characters when ANDed give the same result and can cause problems. If you wish to use ASCII 33 to 255 then you may have to lose case sensitivity by omitting lines 830 and 840.

The swap is done four bytes (a word) at a time and a pointer increased by 4 bytes, until the pointer is the same length as the string, whereupon we return to the sort routine.

```
330 DEFPROCass
340 FOR pass = 0 TO 3 STEP 3
350   P%=code
360   [ OPT pass
370   STMFD R13!,{R0-R12,R14};store
                              registers
380   CMP R3,#0       ;check R3 is
                               positive
390   MOVLT R3,#0     ;if not make zero
400   SUB R1,R1,#1    ;remove CR from
                          string length
410   CMP R3,R1       ;check R3 is less
                            than string
                                 length
420   MOVGE R3,#0     ;if not make zero
430   ADD R1,R1,#1    ;add CR
440
450   MOV R4,R2       ;A%=numstr
460
470   .loop1          ;LINE 1330
480   MOV R4,R4,LSR#1 ;A%=INT(A%/2)
490   CMP R4,#0       ;IF A%=0 THEN
500   BEQ finish      ;        GOTO 1400
510   MOV R5,#1       ;J%=1
520   SUB R6,R2,R4    ;K%=numstr-A%
530
540   .loop2          ;LINE 1350
550   MOV R7,R5       ;I%=J%
560
570   .ret1           ;LINE 1360
580   ADD R8,R7,R4
590   STMFD R13!,{R4-R6} ;save R4,R5
                                 & R6
600   B compare  ;do comparison and
                    swap if necessary
610   .cont           ;LINE 1380 (next
                       line after 1370)
620   LDMFD R13!,{R4-R6} ;restore
                           R4,R5 & R6
630   .cont2          ;LINE 1380
640   ADD R5,R5,#1    ;J%=J%+1
650   CMP R5,R6       ;IF J%>K%
660   BGT loop1       ;  THEN GOTO 1330
670   B loop2         ;GOTO1350
680   .finish         ;LINE 1400
690   LDMFD R13!,{R0-R12,R15}
                    ;restore registers
                  and return to BASIC
```

```
 700
 710   .compare
 720   MUL R5,R7,R1          ;calculate address of first string
 730   ADD R5,R5,R0
 740   ADD R5,R5,R3          ;get address for start of sort string 1
 750   MUL R6,R8,R1          ;calculate address of second string
 760   ADD R6,R6,R0          ;
 770   ADD R6,R6,R3          ;Get address for sort string 2
 780   .nextchar
 790   LDRB R9,[R5],#1       ;get byte of string 1
 800   LDRB R10,[R6],#1      ;get byte of string 2
 810   CMP R9,#13            ;is it a CR i.e. end of string
 820   BEQ cont              ;   if so continue with sort algorithm
 830   AND R9,R9,#95         ;ignore case by ANDing byte with 95
 840   AND R10,R10,#95       ;if case wanted delete lines 830/840
 850   CMP R9,R10            ;compare bytes  IF A$(I%) > A$(L%)
 855                         ;           GOTO 1390 (next line)
 860   BGT swap              ;if greater than, THEN SWAP strings
 870   BEQ nextchar          ;if equal then get next character
 880   B cont                ;if less than, then continue with sort
 890   .swap
 900   MUL R5,R7,R1          ;Recalculate addresses of strings
 910   ADD R5,R5,R0          ; (quicker than storing)
 920   MUL R6,R8,R1
 930   ADD R6,R6,R0
 940   MOV R4,#0             ;set pointer to beginning of strings
 950   .nextswap
 960   LDR R9,[R5,R4]        ;get WORD (4 bytes) of string 1
 970   LDR R10,[R6,R4]       ;get WORD of string 2
 980   STR R9,[R6,R4]        ;swap WORDs in string
 990   STR R10,[R5,R4]
1000   ADD R4,R4,#4          ;increment pointer by WORD length
1010   CMP R4,R1             ;compare pointer with string length
1020   BLT nextswap          ;if not end of string, get next WORD
1030   LDMFD R13!,{R4-R6}    ;else restore registers
1040   SUB R7,R7,R4          ;I%=I%-A%
1050   CMP R7,#0             ;IF I%>0 THEN
1060   BGT ret1              ;           GOTO 1360
1070   B cont2               ;                ELSE GOTO 1350
1080   ]
1090 NEXT
```

It is important when typing in this program that none of the assembler remarks (;) are included, as BASIC sees the BASIC commands and can get confused.

Included in the BASIC program is a demonstration of a sort which sets up C% strings of length 72 characters (line 1160) in the format

"***The green col. is before the sort and the yellow is from the sort***"

where * are random ASCII characters.

The most extreme test is to sort from character number three, *T*, as the sort has to check all the characters from the *T* of *The* to the *t* of *sort* before any differences are seen.

Now use it in your own programs

For those of you who want to use the sort in your own programs, the first thing you have to do is convert your multi-dimensioned arrays to single ones, with two arrays holding the length of each string and the start points.(DIM$)

There are some procedures in the program "Convert" which will attempt to convert your array (if it is possible to convert).

To use this procedure, first write the relevant lines of BASIC to load your array and then fill in what a and b are, i.e. the DIMensions of your strings as A$(a,b). The procedure will tell you the maximum length of each string and the spacing and gives you option of changing the length for a maximum string of 256 (including carriage return).

The only problem you may have in running the program is lack of memory if you have a large array of strings.

You can then decide the lengths you want and store them as DATA statements in your program or read them from the beginning of the store memory, where the length is stored and then the "DIM$" array. Any queries, write to me at the address in the REM statements. (Please send a SAE for replies.) It is also possible, by stating that the start address of strings is at the start of string 45 and that there are only 11 strings to sort part of the array.

I hope you find this routine useful.

Sort routines in RISC-OS

This is a sort using the Heapsort provided within RISC-OS. In order to use, it the strings must be stored as indirection strings and the location of each string must also be stored as a block of 4 byte words (at least until I discover how to find where BASIC stores its strings).

The sort is called using SYS"OS_HeapSort", R0 , R1 , R2

R0 is the number of strings

R1 is a pointer to an array of word sized objects, which in this case is a list of 4 byte words holding the address of the strings.

R2 is the type of object to be sorted, 4 is case insensitive strings and 5 is case sensitive strings

For details of other types, see PRM page 819 (vol.2)

```
 0 REM>Heapsort4A
 10 REM Uses SYS"OS_HeapSort"
           (SYS&4A) to sort strings
 20
 30 DIM A 80100,B 5005
 40 N$="This is a string of length
       approximately 78 characters,
            the 79th to be added- "
 50 FORI=0TO1000 : REM make 1000
              strings of length 79
 60   A$=CHR$(65+RND(57))+N$
 70   $(A+I*80)=A$:!(B+I*4)=(A+I*80)
 80 NEXT
 90
100 FORI=0TO10:PRINT$!(B+I*4):NEXT
110 PRINT'"Sorting........."'
120
130 TIME=0
140 SYS"OS_HeapSort",1000,B,4 :REM
      1000 strings,B = Address Store
150 REM 4 Case insensitive 5 Case
                           sensitive
160
170 PRINT"Time ";TIME/100;" s to sort
                      1000 strings"
180 PRINT
190 FORI=0TO10:PRINT$!(B+I*4):NEXT
200 END
```

The RISC-OS Sort Routine: "OS_HeapSort"

Ian Smith

RISC-OS has an inbuilt routine to perform a Heapsort (SWI &4F). This sort, although not as fast as "Quicksort" has the advantage that it does not use any extra memory than that required to hold the data being sorted. The RISC-OS Programmers Reference Manual refers the reader to "Sorting and Searching" by Knuth for more information and also gives details of efficiency. Suffice it to say that it is **very** fast on the Archimedes!

The following article gives details of two programs you could use to sort Numbers and Characters. The routine is capable of sort any objects of any size but a comparison operator must be written, in assembler, to allow this to be used. Cardinals (positive Integers), Integers and Characters are those data types provided for by OS_Sort.

Sorting numbers

The simplest case is that of sorting numbers in an array. The following BASIC procedure does this :

```
400 DEF PROCNumericSort ( RETURN A(),
                          CardOrInt)
410
420 LOCAL Size%,Number
430 Size% = DIM(A(),1)
440 DIM NumArray Size%
450
460 FOR Number = 1 TO Size%
470   NumArray!((Number-1)*4) =
                            A(Number)
480 NEXT
490
500 SYS OS_Sort,Size%,NumArray
                          ,CardOrInt
510
520 FOR Number = 1 TO Size%
530   A(Number) = NumArray!((Number-1)
                                  *4)
540 NEXT
550 ENDPROC
```

The procedure takes 2 parameters :

A() – The array to be sorted and passed back using RETURN

CardOrInt – a number 0 or 1 to regard the array as holding Cardinal or Integer values.

There are 2 LOCAL variables :

Size% – This is set to hold the number of elements in the array as **any** sized array may be passed in.

Number – A local loop control variable.

The numeric data in the array A() has to be copied into a static array set up in line 440 by DIM NumArray Size%. This is because the sort routine needs to know the address at which the data is stored. NumArray will hold this address. The copying is done in the loop on lines 460-480 where ((Number-1)*4) represents the address offset from NumArray at which the next number is to be stored.

The call to the sort itself, at line 500, is straight forward with the number of elements to be sorted in R0 (Size%), the array to be sorted in R1 (NumArray) and the comparison procedure special case in R2 (CardOrInt).

Lines 520 – 540 copy the sorted data back into the original array A().

The routine assumes that **all** of the data in the array is to be sorted. If this were not the case then a third parameter Num would need to be passed to the procedure and this would be placed into R1.

Assuming an array ActualData has be declared to hold a randomly ordered set of numbers then this procedure can be called with:

PROCNumericSort(ActualData(),DataType)

where DataType is 0 if the numbers are *cardinals* and 1 if *integers*.

The sample test program below is on this month's disk :

```
 10 REM > HEAPNum
 20
 30 REM A simple sorting program
           using the HEAPSORT built
                       into RISC-OS.
 40 REM This sorts an array of
                 INTEGERS or CARDINALS
 50 REM The routine OS_Sort performs
                    a very fast sort.
 60 REM Try changing Max to 20000.
 70
 80 @%=3
 90 Card = 0
100 Int  = 1
110 Max  = 20
120
130 OS_Sort = &4F
140
150 DIM ActualData(Max)
160
170 FOR Data = 1 TO Max
180   ActualData(Data) = Max DIV 2 -
                              RND(Max)
190   PRINT ActualData(Data);
200 NEXT
210 PRINT
220
230 PRINT"Enter ",Card," for a sort
        treating data as Cardinals"
240 PRINT"Enter ",Int," for a sort
         treating data as Integers"
250 REPEAT
260   PRINT "Enter ";Card;" or ";Int;
                                " : ";
```

```
270   INPUT DataType
280 UNTIL (DataType = Card) OR
                    (DataType = Int)
290 PRINT
300
310 PROCNumericSort(ActualData(),
                              DataType)
320
330 FOR Data = 1 TO Max
340   PRINT ActualData(Data);
350 NEXT
360 PRINT
370
380 END
390
400 DEF PROCNumericSort ( RETURN A(),
                             CardOrInt)
410
420 LOCAL  Size%,Number
430 Size% = DIM(A(),1)
440 DIM NumArray Size%
450
460 FOR Number = 1 TO Size%
470   NumArray!((Number-1)*4) =
                             A(Number)
480 NEXT
490
500 SYS OS_Sort,Size%,NumArray,
                             CardOrInt
510
520 FOR Number = 1 TO Size%
530   A(Number) = NumArray!((Number-1)
                                  *4)
540 NEXT
550 ENDPROC
```

Character sorting

Sorting an array of characters is more involved as the Heapsort is designed to sort WORD sized data values and characters are BYTE sized. This is overcome by converting the array of characters into an array of Pointers (Word sized) to characters. The facility to perform this conversion is also built into OS_Sort. The sort can also deal with pointers to Cardinals and pointers to Integers.

```
190 DEF PROCStringSort(RETURN A$,
                       CaseSensitive)
200
210 LOCAL Size%,R1%,Case%
220
230 IF CaseSensitive THEN
240   Case% = 5
250 ELSE
260   Case% = 4
270 ENDIF
280
290 Size% = LEN(A$)
300
310 DIM Data Size%
320 DIM Pointers% Size%*4
330
340 $Data = A$  : REM Copy String
                              into array
350
360 R1% = Pointers% OR (%1 << 30)
370
380 SYS OS_Sort,Size%,R1%,Case%,,Data
                                   ,1
381
390 A$ = $Data  : REM Now Copy back
                            into String
400
410 ENDPROC
```

In this Procedure the 2 parameters are :

A$ – The String to be sorted (An array of Characters) and RETURNed.

CaseSensitive – A variable to indicate whether the case of the letters in A$ is to be taken into account when sorting.

Lines 230-270 set a LOCAL variable Case% to either 4 **or** 5 ready to be passed to OS_Sort to indicate case sensitivity in the sort.

Line 290 determines the number of characters to be sorted by computing the length of the string A$ and storing this in the local variable Size%

Line 310 defines a LOCAL static array Data% the same size as A$.

Line 320 defines a LOCAL static array Pointers%. This is an array of pointers and needs to hold the same number of pointers as there are elements in A$. Each pointer is 4 Bytes and so Pointers is 4* Size% in length.

Line 340 uses the $ indirection operator to copy A$ into the LOCAL static array Data% whose address is known and can be passed to OS_Sort.

Line 360 builds the value to be stored in R1. R1 hold the address of the the array of word sized objects, in

this case pointers to characters. The top 3 bits 29, 30 and 31 are used for more advanced features of the sort and we need bit 30 to be set. This lets the sort firstly create the array of pointers from the actual data and the size of the data. So R1% = Pointers% OR (%1 << 30) sets this bit by moving 1 to bit 30 and then ORing this with the address.

The sort itself is called at Line 380 :

```
OS_Sort,Size%,R1%,Case%,,Data,1
```

R0 holds the number of elements, Size%.

R1 holds the address (and bit 30 set) of the array of pointers.

R2 holds 4 if case is ignored and 5 if case is significant.

R4 holds a pointer to the actual data to be sorted.

R5 holds the size of the data items to be sorted.

Line 390 copies the sorted data back into the array parameter.

The call PROCStringSort(Word$,TRUE) would sort the string Word$ with case being significant.

The following test program appears on this month's disk :

```
 10 REM > HEAPChar
 20
 30 REM Sorting Characters in a
              string using HeapSort
 40
 50 OS_Sort = &4F
 60
 70 INPUT "Enter letters to be sorted
                                : ",Word$
 80 INPUT "Case Sensitive Y/N : ",YN$
 90
100 IF YN$="Y" THEN
110   PROCStringSort(Word$,TRUE)
120 ELSE
130   PROCStringSort(Word$,FALSE)
140 ENDIF
150
160 PRINT Word$
161
170 END
180
190 DEF PROCStringSort...
```

(as previous page) A

Language Column

David Wild

Pascal and 'C'

Since I wrote my last column, I have read another review of Cambridge Pascal – in Risc User. In this, David Spencer comes down firmly in favour of the Dabs Press version of Pascal because it is £30 cheaper than the Acorn version. An important clue to his thinking, though, comes from his assumption that the only people who use Pascal are students whose instructors insist on it. If he believes this than there is no point in examining the real virtues (or deficiencies) of either product.

As you gather, I certainly don't share his view of the use of Pascal. I think that many programmers find it to be a useful and rewarding tool which can produce good programs for the eventual users. There are some programs, inevitably, which require facilities provided only in 'C' but I am sure that most problems can be solved in either 'C' or Pascal without the user knowing any difference – and this is the way that it should be. Generally, the benefits of any programming language are to the programmer and the best programs will be written in whichever language the programmer finds most comfortable.

Much more important than sterile insistence that "my language is better than yours" is the study of algorithms for the solution of problems. In most cases, the difference in efficiency between a poor and a good algorithm will be much greater than the difference between any pair of compilers, assuming that the compilers do not introduce bugs into the programs.

So far as Pascal is concerned, the Acorn compiler is a good program badly let down by its documentation, while the Dabs product is a slightly less good program even more let down by the lack of care in producing the documentation and supporting programs.*

This month's "Computer Shopper" has an article about Object Oriented Programming and its advantages. It seems to me that the Acorn ISO-

Pascal with its separately compiled modules and static variables already provides many of the advantages of the Object Oriented method. Presumably there will, eventually, be an O.O. Pascal for the Archimedes but we already have something to be going on with.

Lisp

In the last few weeks, I have been trying a pre-release version of a RISC-OS extension to Acorn Lisp provided by Mike Houlder of Sheffield. While the product is not yet finished, it civilises Lisp considerably. It is not multi-tasking in the usual sense, as this would be inappropriate for many applications, but one click on a mouse button will allow the application to be suspended while something else runs and another click will allow it to resume operation.

I know that Lisp is not a general interest language but it does have some very interesting applications and it looks as though Mike may have solved some of the problems which had been plaguing Lisp users since the introduction of RISC-OS. There is not much more that I can say about it at the moment – but watch this space!

**(It is with fear and trepidation that I allowed these comments to get through the Editor's net since Dave Atherton of Dabs Press was not happy with last month's comments. However, as I pointed out to Dave, Archive is an open publication in which anyone, including software producers, can express (within reason!) his or her views. Have any other readers had experience of either of the Pascal compilers? If so, please let us know by fax, BBS, disc or letter, what you think. Ed.)* A

Competition Corner

Colin Singleton

There was a small but enthusiastic response to the December beer-swilling problem. The winners will be published next month. I look forward with eager anticipation to a larger entry for January's jigsaw puzzle!

This month's competition

"God does not play dice." (Albert Einstein)

Maybe not, but you can. I have in front of me 30 dice, all different. You may be aware that a standard gaming die (the word dice is plural) has the numbers arranged so that opposite faces always total seven. Also, if you look at one particular corner you will find the numbers 1, 2, 3 in anti-clockwise sequence around that corner.

This is not the only possible way of arranging the numbers 1 to 6 on the faces of a cube. There are 30 different possible arrangements. Hence my 30 dice.

This month's competition is in three parts. See how far you can get!

Part 1. Take six of the dice and build them into a vertical tower so that each of the four sides of the tower shows each of the numbers 1 to 6 (in any order). Also, wherever two (horizontal) faces are in contact, they must have the same number.

If you simply grab six of the dice at random there is only about a 1 in 40 chance that they can form such a tower. My program has identified all the (several thousand) suitable combinations of 6 from the 30 dice. (Hint!)

Part 2. Divide the full set into five groups of six dice so that each group can form a tower as defined above.

Part 3. Form five such towers with one tower in the centre and the other four touching its four sides, in such a way that wherever two (vertical) die faces are in contact they have the same number. This applies to 24 pairs of faces and the centre tower now has only one face visible.

This is Tower Cross, which sounds as though it ought to be a town in the Heart of England, but if you can build it from dice you could win a small prize.

Entries (any form of presentation will be accepted this time, so long as I can understand it) and comments on Archive Competitions past, present or future, either via Paul at N.C.S. or to me at 41 St Quentin Drive, Sheffield, S17 4PN.

P.S. Yes, I really do have a set of dice and if I receive a solution to part 3 I will attempt to verify it in the obvious manner. A

Using RISC-OS !Paint

Karen Dunkley

Over the next few months we will be publishing an occasional series of articles aimed at helping you to make full use of the applications supplied with RISC-OS. For those of you who have not yet upgraded your computer, this series should prove useful when evaluating RISC-OS in comparison with Arthur. We start this month with !Paint. Some of the comments relate more to programmers than general users, but later articles in the series will be less program-oriented

!Paint is the sprite editor provided with RISC-OS. The main, but by no means only, purpose of this package is to enable users to produce icons for use with their own software.

As well producing icons for software packages, !Paint can also be used to modify the RISC-OS system sprites, that is the sprites that represent hardware such as disc drives, or are used for resident filetypes like BASIC or Text. Although these sprites are in the four chips that make up RISC-OS, it is relatively simple to save the sprites as !Paint files. The following short listing, if reproduced as shown, will save the system sprites in the currently selected directory. The default filenames are ROMsprites and RMAsprites, these can be changed by altering lines 30 and 40.

```
10 REM (C) 1990 Karen Dunkley
20 SYS "Wimp_BaseOfSprites" TO R0,R1
30 OSCLI("SAVE ROMsprites ") + STR$~
          (R0+4) + "+" + STR$~(!R0)
40 OSCLI("SAVE RMAsprites ") + STR$~
          (R0+4) + "+" + STR$~(!R1)
50 REM These lines set the correct
60 REM filetype for the saved sprites
70 *Settype ROMSprites Sprite
80 *Settype RMASprites Sprite
```

As an alternative, if you have the !ReDraw application which was written to compliment this article (available on the monthly program disc) you can use its ROM sprites and RMA sprites menu options to save them. Drag the Paint icon for each one into a file viewer to save the file (changing the filename if desired).

Once the system sprites have been saved, you can edit them to suit your requirements. If you are producing shareware or commercial software then I recommend you leave the hardware icons and filetype icons with the default definitions – all applications should be (to a certain extent) harmonious and intuitive.

To start editing the icons, double-click on one of the two file icons that you will now have in the currently selected directory. If RISC-OS has 'seen' !Paint then it will automatically be loaded with the sprites. If you get the error message 'No run action specified for this file' or the sprites are loaded as a picture, !Paint has not been 'seen' and you will need to load it yourself.

First of all we are going to edit the icon for an unknown filetype (a white square with a black outline) – this icon is stored in ROMsprites. Once you have loaded ROMsprites into !Paint, a window containing all the sprites will be displayed. To edit a particular sprite simply double-click on its icon in this window and it will be displayed in a window with the sprite name on the title bar.

Initially, the sprite will be displayed in a small window. The size of this window is not increased by the usual method – instead press the menu button whilst inside the window and move the pointer down to the arrow next to the Zoom option. A small window entitled Magnifier will be displayed. To increase the size, press <select> on the arrow in the top left of this window. Although the size to which you enlarge the sprite is a matter of personal preference, I find 10:1 is a reasonable size.

As well as the Zoom option, there is a variety of other facilities available from this menu: Info, Save, Paint, Edit, Zoom, Grid and Print.

Info

Info displays a window which specifies the name of the sprite, the screen mode that it uses (normally screen mode 12) and the size of the icon. Icons are usually produced in two sizes – this is to prevent RISC-OS having to scale down an icon when the user chooses Full Info or Small Icons from the Filer menu.

The Filer menu is the one displayed when you press the menu button with the pointer in a directory viewer. The standard size (as per the Acorn Application Authors Guidelines) for a large icon is 34 by 17, the size for a small icon is 19 by 9. The size of the icon is expressed in the pixels. The remaining two options, Mask and Palette, determine the appearance of your icon. Mask is normally set 'on', while palette is usually set to 'off'. Mask will usually need to be set if you wish to create icons which are non-rectangular in appearance.

The use of Mask enables you to take advantage of an extra "colour". This extra "colour" can be used to give your icon a transparent background. The advantages of a transparent background are most noticeable when you select your icon – if this colour is not used then the background will show up with reverse colouring and, more often than not, it will not fit in with the general appearance of the desktop environment. Similar advantages can also be applied to leaving Palette off.

Save

Save is used to save your sprite. If you have defined your own palette then this is also saved here. A default filename of 'spritefile' is used for a new sprite. If you haven't defined your own palette, this option will not appear on the Save menu. The default filename for a new palette is 'Palette'. To save the sprite or palette, drag the icon in the save box to a directory viewer. Unless the full pathname is entered in the space for the filename, clicking on the OK box will result in an error message requesting you to drag the icon to a directory viewer in order to save it.

Paint

The majority of the facilities provided in !Paint for editing and defining icons are found by moving onto the Paint option on the Sprite menu. The first of these features is Select ECF. This leads to a dialogue box which enables you to create a pattern from pixels in the sprite. An ECF (Extended Colour Fill) is made up of a rectangular section of the sprite which is 8 pixels in height. The pixels used are always those in the bottom left hand corner of the sprite. After a set of pixels has been selected, choose the ECF by clicking on it in the !Paint colour window.

Set Colour

Set Colour is used to select the colour used for any operation performed via the !Paint toolbox. To choose a colour that has already been used in your sprite, move the pointer to the required colour and press <menu>. Move the pointer to the Set Colour option on the menu and press <select>. This colour will then be used in any toolbox operations until another colour is selected using the same method or by selecting a colour from the colours window. If you are editing several sprites simultaneously, remember to use the correct colour window as !Paint has a separate colour window for each sprite in memory, each of which has its own separate current colour.

Show Colours + Show Tools

Show Colours and Show Tools will cause !Paint to display the colour window for the sprite that you are currently editing together with the standard !Paint toolbox. Only one toolbox window need be opened as, unlike the colours, !Paint only uses one toolbox regardless of how many sprites you have in memory. Clicking on these can also be a useful way to bring the toolbox and colours to the front of the screen if they've got hidden behind other windows.

Small Colours

Small Colour is mostly used in 256 colour modes where the colours' window would take up a large proportion of the screen. The main disadvantage of using this option is that it prevents !Paint from displaying the numbers of the colours – in 256 colour modes this can be rather difficult as many of the colours are similar and can be almost indistinguishable from each other.

Edit Palette

The Edit Palette option is used to define your own palette. This option can only be used if you set 'Palette on' when you defined your sprite.

Edit

The next option on the Sprite menu is Edit. Moving over the arrow next to this option will give you a further menu titled Edit. Options on this menu are mainly concerned with moving and re-sizing your sprite. The first three options will flip the sprite vertically and horizontally as well as rotating it.

The sprite can also be re-sized and re-scaled from this menu by using the Re-size option. To re-size the sprite, move the pointer over to the arrow by Re-size and a dialogue box will appear. Using the arrows in the dialogue box, you can reduce or increase the dimensions of your sprite. Another, perhaps easier, way to enlarge your sprite is to use the Insert Column or Insert Row options. These options will insert blank lines in your sprite. The lines will be inserted at the point where you last edited the sprite, that is, where you last placed a pixel. These options are also available to delete rows or lines, again at the place you last edited the sprite.

Although it is much easier to work on an enlarged version of the sprite it is also useful to see what it looks like at its real size. This can be done by keeping the window that was opened when the sprite file was loaded, visible on the screen – it automatically reflects any changes you make to the sprite.

One of the most useful features of the Edit menu is the facility to provide a transparency mask. This enables you to give a transparent background to a sprite that was created with mask set off. The setting of Palette can also be changed this way, which enables you easily to re-define the palette for existing sprites.

For detailed sprites it is often useful to have a grid. This will enable you to reproduce or scale sprites more easily, for example when producing a small version of an icon sprite. The grid option in !Paint allows you to choose the colour of the grid from a range of sixteen pre-defined colours from the RISC-OS palette.

Finally, you may like to produce a hard copy of your sprite. !Paint allows you to do this by using the RISC-OS printer drivers, such as !PrinterDM. Selecting the print option produces a dialogue box that can be used to specify the number of copies required, whether the paper is Landscape or Portrait, the scaling of the sprite and its position on the paper. It is not necessary to choose these settings each time you wish to print a sprite – if you simply click on the Print option, the sprite will be printed with the previous or default settings.

Having edited the system sprites, all that remains to do is to save them and to tell the operating system to look on disc for the sprites instead of in the operating system ROMs. This may sound complicated but it is really quite easy. Simply save the sprite file in your !System directory with the new sprites filename and enter the following line in the !System.!Boot file. Remember to save all the sprites by using the save of the original window rather than the one you have been working on.

```
IconSprites <Obey$Dir>.NewSprites
```

The new sprites should now be used instead of the default system sprites. If you have modified any of the sprites on the icon bar such as the task manager icon or the disc drive icons you will need to force a re-draw of the screen. This can be done by pressing <F12> and then pressing <return>.

If you are using !ReDraw you can load a sprite file by dragging it to !ReDraw's icon. It will load the sprites and then re-draw the screen so that any which are onscreen are updated. You can also have the screen redrawn either by selecting the 'Redraw' option from the menu or by clicking <select> on the icon.

A selection of sprites that I have created is supplied on the monthly magazine disc – they can also be downloaded from the Archive bulletin board. !ReDraw is supplied on the magazine disc and is also available on the Archive bulletin board.

The !ReDraw application has the facility to save both the RISC-OS ROM sprites (mainly sprites for hardware and filetypes) and the RMA sprites (sprites for applications that have been 'seen' by RISC-OS). Choose either ROM Sprites or RMA Sprites and drag the sprite icon to a directory viewer to save the file.

!ReDraw will also refresh the screen if you click on the application icon, causing RISC-OS to change any sprites which are onscreen and have been redefined. New sprites can be loaded by dragging them to the icon and the screen will update automatically.

If you create any good sprites please send them to Archive for possible inclusion on the magazine discs or, alternatively, you could upload them to the Archive bulletin board. A

Fireball 2 Review

David Bilsby

FireBall II (Cambridge International Software) is based on the classic bat'n'ball breakout game. "Couldn't a 32bit Archimedes do better than playing breakout?" Well yes, because FireBall II's author, Simon Heather, has taken it well beyond the original breakout into a completely new game concept.

FireBall II can be run from desktop or the command line. From desktop just click on the bat icon and wait (FireBall II is RISC-OS compatible and returns to desktop without data loss). A title screen appears and background music plays as the rest of the program loads. Once the game has finished loading, two vertical pillars close into the middle of the screen and then open again showing the main menu (all screen changes are carried out in this way, quite neat really). The playing area is square and the rest of the screen on the right is taken up with the hi-score, present score, wave number, number of lives, mouse sensitivity, game speed and sound options.

Pressing <space> or a mouse button starts the game. The bat is moved with the mouse though there is a keys option using Z and X and also V, B and N which correspond to the three mouse buttons. (There is also a turbo option C.) The ball position on the bat can also be moved left or right by the <menu> and <adjust> buttons and the ball is fired off with <select>. The ball, of course, travels up the screen, hits a brick and bounces back – this being the only similarity with breakout. The aim is to clear all sixty screens in sequence. You are helped in this task (or hindered as the case may be) by capsules which drop from the bricks at random. Some of the capsules have a compound effect and some cancel others out already obtained. The capsules are lettered for identification and are listed below:

Catch – allows you to catch balls on your bat

Double balls – splits each ball into two

Extended bat – extends your bat by 35%

Fireball – turns balls into fireballs (destroys many bricks in one go)

Jump – jumps to the next screen

Laser bat – fires lasers from your bat

Mirror bat – an identical bat appears as a mirror image

Normal bat – the bat loses any special properties (except F)

Protect bat – the bat becomes protected against bombs

Reverse bat – the bat will move in the wrong direction

Shadow bat – the bat will have two others attached

Xtra balls – produce up to ten balls on the screen

Depending on the screen you have got up to, each capsule can be very useful (except reverse). For example, on levels with bombs, Protect, Collect and Fireball are useful as even bombs can be collected and have the fireball effect. Lasers are also a very useful item and can be turned off if necessary or fired singly with <adjust> and <menu> respectively, <select> turning them back on again.

As well as different capsules (which score 50 points) there are different bricks with different score values and characteristics. Bricks score between 1 and 10 points and vary from easy-to-destroy to bomb-droppers. Some are indestructible, others invisible and some reappear within a few seconds of being hit.

A good feature of the game is the use of the Archimedes' sounds. The music is fairly addictive but with it turned off you can hear all the other sound effects of the game – a possible 266k of sampled sounds. These include the ball hitting the bricks and walls, as well as some unusual ones like a Vincent Price laugh when you miss the ball, an excerpt from Relax when you pause the game with <P>, a sample from War of The Worlds saying 'the sound ceased' when you turn off all sound and quite a large sample from Paradise City when the game is over. If you are good enough you will then find yourself on the saved-score table but if not you can still make the temporary Today's Hi Scores.

Also, as well as a mouse-sensitivity control, there is a game-speed control which allows the game to be speeded up by 2 or 3 times. When speeded up by a

factor of two, the score for all bricks and capsules is doubled and when speeded up three times it is tripled.

Fireball Designer

If you want to try some different screens then FireBall II has its own built-in screen designer. There is not enough room here to describe all the options but basically it allows you to change or totally redesign your own screens. You can place any of the 14 bricks in any kind of pattern, making the screens as easy or as difficult as you like. These can be saved, reloaded and played in the normal way or, from the editor, you can test play a screen with infinite lives to see if you can complete it yourself. (Full instructions on the game and the editor controls are provided in a text file on the disc).

Overall the game is very appealing graphically and is addictive to play. It can be purchased from Cambridge International Software for around £20 (the price will be confirmed when it is released, hopefully by the time this review comes out). I can thoroughly recommend this game. A

First Word Plus Column

Stuart Bell

First, an apology. In my review of First Word Plus Release Two last month, I observed that there is no way of going back up a directory structure comparable to Release One's action of displaying a parent directory when you select the close icon of a directory display. Of course there is! RISC-OS offers a filing system menu option 'open parent'. Perhaps I should have read the RISC-OS manual properly when I upgraded from Arthur.

FWP2 a month on

After that relatively hurried review, the last month has given me chance to use FWP2 at my leisure. My main conclusion is that I would not willingly go back to FWP1. Even though, with a 1M machine, I can't multi-task it with other serious applications, the fact that I can get at the file manager or other utilities, that I can move at will around the directory structure and display directories with 'full info' to check the dates on which files were last amended, means that FWP2 is significantly easier to use than FWP1.

More on MODE 16...

Further to that review, I've been exploring mode 16 (132 x 32 text, 1056 x 256 graphics in 16 colours) in rather more detail. As I noted last month, FWP2 works in mode 16 very nicely, especially when you need two documents on-screen at once. It also allows directory viewers to be displayed alongside rather than on top of the text on which you are working, and the desktop display itself can show 60% more information.

My explorations started when I tried to build a sensible directory structure for my new Oak SCSI drive, integrating the three main applications which I use; namely FWP, Minerva's System Delta Plus and their SigmaSheet. I encountered two problems:

Firstly, how do you get into mode 16 and stay in it for all applications? To start with, use the !Configure application on the Applications Discs to set Desktop Screen Mode to 16. As far as FWP2 – and other well-behaved RISC-OS applications – are concerned, that's all that's needed. (The on-screen clocks have become oval rather than round, but we can live with that.) Sigmasheet is no problem – it actually leaves the Archimedes in mode 16! For SD+ I just splattered a few *MODE 16 instructions around the program – especially at exit points – until it worked and I suspect that this approach will work for most applications which are written at least partly in BASIC. Of course, non RISC-OS compatible programs like SD+ won't actually use mode 16 but at least when modified they don't mess up the default desktop screen mode.

You can, of course, change modes 'on the fly' by using that option in the !Palette application. Going from mode 12 to mode 16 may require more memory to be allocated to the screen using the Task Manager – and that can be a problem if FWP has grabbed too much memory. If that's the case, adding a suitable '-max' entry to the line

```
WimpSlot -min 416k
```

in the !Run file for FWP2 will help. I used '-max 496k' but it's worth playing around with, so that

perhaps 32k is left after loading FWP2 for other small applications such as !Calc.

Almost certainly, low and mid resolution colour monitors won't be able to display mode 16 text without inducing headaches. However, if your monochrome monitor will cope then welcome to the 'Friends of Mode 16'. You won't go back to Mode 12, I promise!

...and on Killing Modules.

The second problem is that when exited and deleted from the icon bar all three applications leave relocatable modules cluttering up the module area of memory, thus stopping the modules which the next application needs from being loaded – at least on 1M machines. These have to be killed by adding *RMClear to the BASIC source of SD+ and SigmaSheet. FWP2, being written entirely in ARM code, is more of a problem. Most simply, after terminating FWP2, a *RMClear can be typed in after using <f12> to get the * prompt. It is helpful that *RMClear doesn't remove modules which have been loaded from podules (e.g. the SCSI modules) but surely, the system shouldn't need users to do this manually? Or is there a way round this? Comments, please. *(See also Archive 3.4 p 4 and p10. Ed)*

Finally, how do you drag your super-fast Archimedes down to a snail's pace? Using FWP2, select a reasonable size selection (what we used to call a block) and select 'Title Word' under the style menu. Now go away and make a cup of coffee. Come to think about it you've probably got time to fly to Brazil and pick the beans yourself. Only joking, Acorn, but someone's written some pretty awful code for this quite useful new facility. A

Help!!!!!!

• **Articles please** – Here are a few suggestions for articles that people have sent in, i.e. "Please would you publish an article about... " If anyone fancies writing any of these or any others for that matter, do let us know. Basically, the value of Archive is in the articles you offer so keep the thing going by offering to write. If you have the ideas and the technical knowledge but are not the world's best writer, don't hold back. Within reason, we can tidy up your efforts and make them readable.

System Variables for Beginners

Data Interchange with Z88

MIDI – Survey of available hardware and software

Using a Psion Organiser with Archimedes

Hardware Projects – I^2C Interface

Using Atomwide's prototype boards

Also, what about an Education section? I doesn't have to be monthly, so you need not feel under any pressure. Also, what happened to the music section that someone was going to write for us?

• *"**Wanted** – Replacement single drive front fascia for A310. Ring Barney on 01–58–3479."* Why am I reproducing one of the Small Ad's in the Help section? I think there may be a number of folk with Barney's problem. (He's the second this week who has contacted the Archive office.) He bought a 310, added a second internal 3.5" drive, which comes with a replacement front fascia with two slots, and now he wants to upgrade to an internal hard disc... but where's the old single slot front fascia??!!?? If you have one you could let him have or, if he's already got one, one that you would be prepared to offer to someone else, let us know. We will act as a clearing house, assuming that the recipient will be grateful enough to donate something to our charity box! Thanks.

• **Public Key Cryptography** – If anyone knows anything about this and/or is interested in implementing it on the Archimedes, George Foot would like to hear from them.

• **RISC-OS driver for KXP1124** – There is a First Word Plus printer driver for Panasonic KXP1124 on Careware 5 but has anyone done a proper RISC-OS driver for it? Roger Lakeman, Didcot.

• **Where's my file anyway?** Richard Skemp would like to print a file and include the file's full pathname on the listing. Does anyone know how to do this? Contact Richard on (0203) 418064.

Help offered

• **Stereo Sampling Service** – If you want to get your sounds into the Archimedes without buying a sound sampler, Jeremy Mears is offering a sound-sampling service. For further details contact him at 21 Collum End Rise, Leckhampton, Cheltenham, GL53 0PA.

• **Star LC24-10 PipeDream Printer Drivers** – A set of 13 printer drivers has been developed for PipeDream 3 which will allow printing using the Normal, Ornamental or Style types with Draft, Prestige, Orator and Script modes. If anyone would like a copy, they should send a blank formatted disc with return postage to Mr J Charman, 45 Smiths Lane, Fakenham, NR21 8LQ. A

PipeLine

Gerald Fitton

System Response Time

I guess that you will realise by now that most questions arising in PipeLine take about two months to obtain a reply. What happens is that you write to me a little after an issue of Archive in, let's say, month 1. I use these letters (and a few thoughts of my own!) to produce a script which I send to Paul in the first week of month 2. This script in included by Paul in the Archive edition which subscribers receive early in month 3. Hence the apparently long, but I think inevitable, delay in getting a response to you via the magazine. Sorry!

The Monthly Disc

In earlier PipeLine columns, I have made reference to "The Monthly Disc" and now I've had about half a dozen letters asking me what this "Monthly Disc" is. Norwich Computer Services produce a disc each month which was originally intended to include programs listed in the Archive magazine so saving readers the trouble of typing in long BASIC (or other) program listings.

Maybe the readership of Archive has changed, maybe Adrian Look's articles and disc have convinced many that it's not easy to write BASIC programs which run in the new RISC-OS WIMPs environment. Whatever the reason, the Archive magazine and monthly disc now contains fewer BASIC programs than it used in the days of the Arthur OS and very few which run as cooperative multi-tasking programs under RISC-OS.

I still believe that the monthly disc can provide a useful service to Archive readers by including on it examples of good practice such as images created with !Draw or !Paint which are difficult to include in Archive as text. An extension of this idea is that the disc can contain substantial files created in other environments such as Acorn's First Word Plus, DeskTop Publishing and, of course, Pipedream. There is a problem here for Archive's Editor – what file types can be included and what should be forbidden? For example, should MS-DOS files be included? Anyway, I believe that whilst there is a PipeLine column published in the magazine, PipeDream format files (type &DDE) and their related "Tab" files (which show up as file type !Edit in a RISC-OS directory window) should have a place on the monthly disc.

Now for an apology. In Archive 3.3, I referred to "examples on the monthly disc" of using PipeDream as a database and I wrote that you would find on the monthly disc some examples of database files in PD and Tab format together with example Form files for printing them out (using the technique known as mailmerge which I described in the PipeLine column). These files were unfortunately missed off the monthly disc. Sorry! Hopefully, by the time you read this, all those of you who have written to me in anguish will have received a copy of these missing files. *(These files are included, hopefully(!), on this month's disc. Ed.)*

Outline fonts, RISC-OS printer drivers and the 310

A few months ago I asked readers and Colton the best way of using PipeDream 3 on a limited memory machine. I've received quite a few hints and tips which help but I've also received many letters from readers who are most upset because they cannot get their system to work. I quote Prof J R Greening who says "The fact is that PipeDream 3 and outline fonts are incompatible with a 1M machine .... ".

My own machine is the old 440 with 4M of memory and a 20M hard disc so I find it difficult to emulate a 1M machine but, according to the Task Manager, I've used up about 1.7M. Using "Tidy up" (click the centre mouse button over the PipeDream icon and select "Tidy up") has cut this down to 1.5M. Nevertheless, the consensus of opinion is that the Professor is right and that the only satisfactory way of producing high quality printed copy from PipeDream 3 on a 310 is to add an extra megabyte of RAM.

I believe that whilst there may be some new programs developed which will "RUN" on a 310, it is going to become increasingly difficult for 310 users to get the best out of their system without increasing the size of the RAM. I see a lot of small ads offering 310's for sale.

PipeDream as a spreadsheet

This month I am going to describe how to construct a simple spreadsheet using Pipedream 3. If you have PipeDream 2 then you can still carry out the exercise but you may have to modify the instructions slightly. The spreadsheet is a set of multiplication tables. You will find my version of the completed spreadsheet as "Multiply01" on the monthly disc.

Double click on the !PipeDream icon to install PipeDream on the icon bar. Click <menu>, run the pointer through "Windows" and select "New window". Save the newly created file as "Multiply01" and its name will change to "Multiply01". From the "Files" menu select "Options" and then make the new slot format "Numbers" (so that all new slots are "expression slots" and not character slots), turn on the "Borders" and the "Grid" but turn off "Justify" and "Wrap". Select 0 decimal places. Click on the "OK" box. You should now save the spreadsheet again and keep doing so regularly.

Use <ctrl-f9> eight times to create columns up to N. Now use <ctrl-W> to set the column width to 5 and the range of columns to A N (i.e. all the columns at once). I like to give my spreadsheets a name on the sheet – type into A1 the text "Multiplication Tables". Use Layout – Centre Align (<ctrl-LAC>) to centre the name in the first row. I prefer to create the spreadsheet in the system font for clarity and change the font for printing.

Now to the spreadsheet proper. Press <return> a couple of times and get the cursor into slot A3. You will see that you are in A3 by looking at the top left of the spreadsheet window. Enter the number "1" and press <return>. If all goes well you will find that the number 1 appears in the A3 slot. Tap the <tab> key to move to slot B3 and type in the formula A3+1 and press <return>. If A3+1 appears in slot B3 instead of the number 2 then you have a character (label) slot instead of an expression slot – to correct this tap <f2> and <return>.

The next step is to replicate the formula which is in B3 across the row to N3. I find the best way is to put the cursor in B3, tap <f3> to mark that slot and then use <ctrl-BRE> to bring up the Block Replicate dialogue box. The Range to copy from will already contain B3 because we marked it with <f3>. The Range to copy to will contain B3 because the cursor is still in B3. Make this latter range B3 N3 and press <return>. If you are still doing things correctly you will find the numbers 1 to 14 appear across row 3.

Clear the markers with <shift-f3>, move the cursor into box A4 and enter the formula A3+1. Mark A4 (with <f3>) and then replicate from A4 to the range A4 A20. You will get a column of numbers from 1 to 20 in column A. Clear the markers.

Place the cursor in B4, type in the formula B$3*$A4 and press <return>. The number 4 will appear in slot B4.

You have nearly finished. Mark the slot B4 and then replicate it to the range B4 N20 (i.e. across the whole sheet). If you have made no mistakes, you will find that the whole sheet replicates and produces the multiplication tables. If you have incorrect values appearing then check carefully that you have typed the $ signs in B$3*$A4 correctly before you replicated B4 across the sheet. The $ sign just before the 3 (B$3) "fixes" the row (row 3) which appears in the replicated formula. If you left out the $ then you would find that in say B6 you would have the formula B5*etc instead of B$3*etc which is what you want. In the same way the $ in front of the A ($A4) "fixes" the column (column A) which appears in the replicated formula. If you move the cursor to D7, you will find that the formula is D$3*$A7; without the $ signs the formula would have been D6*C7. If you are still confused than try

leaving out the $ signs from B4 and see what happens when you replicate.

To make your version the same as the one on the monthly disc you should now protect all the slots except A3 and B3. Mark the whole spreadsheet from A1 to N20. Now you can protect all the spreadsheet with <ctrl-BPS>. Clear the markers, mark A3 & B3 and use <ctrl-BPC> to clear the protection of these two slots.

You can now change the values in either A3 or B3 or both to get a range of multiplication tables. Try it by typing 10 into A3. Not as good as a calculator perhaps but it is a simple example of the use of replicate and a harmless way of learning how the $ sign affects replication.

I have the outline fonts and RISC-OS drivers that came with the Acorn DTP package. My preference for tables like this is to use Homerton.Medium 12 point as my main printer font with the name "Multiplication Tables" in Homerton Bold at 12 point (use Insert font from the print menu). The default printer line spacing is 12 point – I prefer to make the line spacing two points more at 14 point (again from the print menu). You can vary these settings if you prefer something else.

More spreadsheets

Maurice Edmundson has sent me (on disc) a most interesting collection of spreadsheets and notes on their construction which can be used to control a bank account. I am sending these to Paul for the monthly disc. Maurice suggests changing to mode 16 – in PipeDream 3 this can be done from the palette icon on the icon bar. If you get the monthly disc and have any improvements for this spreadsheet or if you have any problems, please let me know.

Database problems

Has anyone followed up the database mailmerge exercise trying out "Omit Blank Fields"? John Jordon has had some success with address labels where some fields are empty using this advanced technique. What he really needs is a hard space character. Does PipeDream have a hard space character? If so what is its ASCII code?

Snapshot

I have had a few letters on disc. Good. However, I have noticed that many people have used @@D@@ to produce the date for the letter. When I load the disc file I can't tell what date the letter has been written because the date shown will always be the current (i.e. today's) date. The way round this is, when you have finished, use "Snapshot" to fix the date so that it won't change. I have a disc file of a letter from Colton suggesting that people don't use "Snapshot" enough and that it might be a useful facility to mention in PipeLine. Guess what the date said on the letter – yes – it gave the current date! Seriously though, have you any thoughts on this matter of "Number <> Text" and "Snapshot"? If so then let's hear from you.

Format to two widths

I heard from Colton today that nobody has yet won the bottle of champagne. My solution is on the monthly disc. Perhaps Paul will verify that I have "done the trick" with the hard copy of this paragraph. *(Looks OK to me. Ed.)* Unfortunately I have disqualified myself from winning the bottle of champagne. Still I have not received any clues from anyone so I feel quite entitled to put this on the monthly disc now as "all my own work". If you have a look at the disc file, you will see that it is quite possible to format to two widths (or three or four or more) even within the same paragraph. I am sending this off to Colton and we shall see if they have a better solution. My method would be simplified if I had a "hard space" – there must be one somewhere in Acorn's character set!

LC10 colour printer

If you want a colour LC10 RISC-OS printer driver contact Tony Cheal at Ace Computing.

Graphbox to PipeDream

Use <ctrl-enter>, "Numbers <> Text" rather than <f2> to get rid of "Bad Expression". The advantage is that you can work on large blocks, the whole sheet(?), with "Numbers <> Text".

More to come...

I have had some letters about macros, redefining function keys and one or two other subjects but they will have to wait a while. Please don't let this put you off writing to me. All contributions are read carefully and those on disc are most welcome. Please be patient about getting answers though. A

Writing RISC-OS Applications

Alexander Goh

This article is not called "Programming the Window Manager". Since there have been many such articles in the various Acorn magazines, I thought that a new approach was required. In this series of articles I'll be telling you how to get the Window Manager itself to do most of the dirty work for you and looking at the !FormEd application. You'll also end up with a BBC BASIC V procedure library and a scientific calculator application (amongst others).

Future articles

The plan is to work to the following schedule:

Article 1:	Introduction & necessary theory
Articles 2-3:	Scientific Calculator application & FormEd
Articles 4-6:	More ambitious application & advanced use of FormEd
Article 7:	Conclusion & tidying up Procedure Library

We are going to look at a couple of simple applications as examples – going right in at the deep end with something like a full-feature text editor would leave many people more confused than they were at the start of the series. The first program is a simple Scientific Calculator which shows the basic ideas behind a Wimp program. The second introduces more complex ideas such as manual re-drawing of windows and transfer of data between applications.

During the series there'll be various 'asides' in which I will try to explain things such as how FormEd works and provide some tips for making your programming easier. All of the procedures included in the programs will be collected together in the last article (along with some new ones) and a BASIC V Wimp library will be created to make writing future applications easier.

Before we can go any further however, we must cover some theory. I'm going to briefly go over SWI calls, Indirection operators, Bit-mapping and Multi-tasking for those of you who don't know much about them. If you do, then just bear with me and wait until next month when we'll start on the calculator. Three of the sections (SWIs, Indirection operators and Windows) are essential reading. The fourth (Bitmapping) can be skipped if you want as you can always use FormEd or my library routines to set window/icon flags.

SYS, SWIs and indirection operators

Much of the specialised work on the Archimedes is done via Software Interrupt (SWI) calls, so a knowledge of them is essential in programming the Wimp. SYS and SWIs are documented in the BBC BASIC Guide and the RISC-OS PRM so I'll just go over them quickly by providing a short example – the OS_ReadPoint SWI.

The PRM documents OS_ReadPoint as follows:

> **Function:** Read the colour at a specified point on the screen.
>
> **On entry:** R0=X co-ordinate; R1=Y co-ordinate
>
> **On exit:** R0,R1=preserved; R2=colour; R3=tint; R4=screen flag

The format of the SYS call is

```
SYS"SWI_Name",R0,R1.R2...etc TO
    R0,R1,R2.... etc
```

To use this call to read the colour at a set graphics co-ordinate (here I'm ignoring the screen flag):

```
SYS"OS_ReadPoint",X%,Y% TO
          discard,discard,colour%,
                    tint%,discard
```

The variables colour% and tint% now hold the appropriate values. As X% and Y% are preserved we don't need to re-read them – the same goes for the screen flag as I'm not going to use it here. The call could therefore be re-written as:

```
SYS"OS_ReadPoint",X%,Y% TO
    ,,colour%,tint%
```

I suggest that you consult both the PRM and BASIC Guide if you are unsure of how to make a SWI call from BASIC as they are absolutely essential for Wimp programming.

Indirection Operators

Sometimes, a SWI will use too many parameters,

even for SYS. In this case, you have to read and write all the information directly from a block of memory using the indirection operators ?, ! and $ (PEEK and POKE to anyone who learnt to program on Spectrums or other dinosaurian home computers).

First you have to reserve a block of memory using a version of the DIM command, which allocates the memory and puts the address of the first byte in the specified variable.

```
DIM block% 1024
```

reserves a continuous block of 1024 bytes of memory and puts the address of the first one in the variable block%. The ? operator (called a query) can then be used to read or write a single byte of the block. To fill the block with Paul's initials you could use

```
?(block%+0)=ASC"P"
?(block%+1)=ASC"E"
?(block%+2)=ASC"B"
```

You can read the value back by using:

```
VDU block%?0,block%?1,block%?2
```

Note that block%?2 is the same as ?(block%+2) but is much quicker to type. However, you should not use block%?2+X% when you really mean ?(block%+X%+2) as it will be interpreted as X%+block%?2. The correct version is: block%?(X%+2).

The ! indirection operator (called 'pling') is similar to ? but operates on words not bytes. (on an Archimedes, one word is 4 bytes or 32 bits.)

The $ indirection operator (called 'string') operates on entire text strings. The example above could have been written as

```
$block%="PEB":PRINT $block%
```

Note that you cannot use block%$4 as this causes all sorts of syntax errors. Here you must use the rather long-winded $(block%+4). Also, there are complications with using $, so it's usually better to use a function that returns a string – I'll include one later.

For more information on indirection operators, consult the BBC BASIC Guide.

Bit-Mapping

This section is not essential reading but understanding it will give you a much better understanding of window/icon flags and how the machine works.

If you are not familiar with base 2 (binary) and base 16 (hexadecimal) then I'm afraid you'll have to get your old maths books out. *(You forget, Sandy, that some of us are so old that binary and hex were not taught when we were at school! However, if so, read "a trip to the local library will be necessary". Ed.)* You need to know binary because it is the counting base which computers normally use and hexadecimal because it's a lot easier to convert between binary and hex than it is to convert to decimal.

BBC BASIC has two conversion specifiers: & and % that will convert numbers from one base to another. Any number proceeded by an ampersand (&) is taken to be a hex code and any number proceeded by a % is read as binary. Thus, to find out the value of %1001 in decimal (9), type:

```
PRINT %1001
```

It's very easy to convert a binary code to hex – you just divide it into nibbles (four bits and no, I didn't make these names up – two nibbles do make a byte) then work out the hex for each nibble separately. For example %10100111 is made of two nibbles, %1010 and %0111. The first nibble is 10 (&A) and the second 7 (&7). The number when converted to hex is therefore &A7 (decimal 167).

To use bit-mapping, you also need to know about the bitwise versions of the AND, OR and EOR operators. When used as operators on numbers, they compare the two numbers one bit at a time and each single bit of the output relating to the corresponding bits of the input values.

AND will output a 1 if both inputs are 1, otherwise it outputs 0.

OR outputs 1 if either or both of the inputs are 1

EOR outputs 1 if either input is 1 but outputs 0 if both are 1.

These operators can be used to set/toggle window and icon flags. To set a particular bit in a flag, you OR it with 1. Using EOR instead of OR toggles the

bit and ORing it with 0 clears it. For example, say you have to set bits 2,4 and 6 of a number, you would use:

```
number = number OR %101010
```

If you have a menu item that can be shaded (turned grey so you can't select it), you can toggle the greyness on and off by using

```
iconflag = iconflag EOR 1<<22
```

which works because 1<<22 is the value of bit 22 – i.e. it is equivalent to 1 shifted 22 bits to the left. This only works on BASIC V as it is the only one with the << and >> shift operators.

Multi-Tasking in general

A single tasking Wimp program is identical in most respects to a multi-tasking one except that it just ignores any messages it receives. Because of this, I won't describe single tasking programs.

An application starts by calling SWI "Wimp_nitialise" which starts up the Wimp and tells the Task Manager that the program exists. Then it makes repeated calls to SWI "Wimp_Poll" which is the program's means of communicating with the Window Manager. When the Wimp wants something done (or would like to tell the program that something has happened) it notifies it via Wimp_Poll by returning a unique 'reason code'. The program looks at the reason code and decides what to do with it.

The following is typical of a polling loop. Notice that I haven't used line numbers and neither should you. You can enter my unnumbered programs straight into the BASIC Editor or into Edit and *BASIC -LOAD the file. Of course, without line numbers, you can't use GOTO, GOSUB or a non-relative RESTORE – but this is how it should be!

```
SYS"Wimp_Initialise",200,&4B534154
          ,"Application Name" TO
                    versn%,taskid%
REPEAT
SYS"Wimp_Poll",mask%,B% TO reason%
CASE reason% OF
      WHEN 1:PROCredraw
  :REM Window needs to be redrawn
      WHEN 2:PROCopen_window
:REM Window needs to be opened
      WHEN 3:PROCclose_window
:REM Window needs to be closed
      WHEN 6:PROCbuttons
:REM Mouse button pressed
      WHEN 17,18:PROCmessage
:REM Message from another
      application.
  ENDCASE
UNTIL bored
SYS"Wimp_CloseDown":END
```

The program works like this: the "Wimp_Initialise" call informs the Task Manager that the program exists. The 200 is the minimum version number of the Wimp system which the program needs to run multiplied by 100. This program therefore requires Wimp version 2.00 or later to work. As RISC-OS is supplied with version 2+, you should always use the number 200 (until Acorn decide to invent a new machine).

The &4B534154 is the word "TASK" and tells the Task Manager that this is a multi-tasking program. If this value is not present, or is incorrect, the program will be run as a single-tasking one. If you can't remember an 8 digit hex number, then the following is acceptable (but far less succinct):

```
DIM task% 5:$task%="TASK"
SYS"Wimp_Initialise",200,!task%,
          "Application name" TO
                    versn%,taskid%
```

"Application name" is the text string that the Task Manager will display on the Task Display dialogue box (the thing with the green and red sliders) so make it meaningful – use the the name of the application (without the !) or some description of its function.

In this case, we've used the initialise call to return the version number of the Wimp (times 100) and the program's task handle in the variables versn% and taskid%. The task handle is a unique "registration code" assigned to the program and is used by other applications to send messages to it.

Wimp_Poll

The Wimp_Poll call gets a reason code from the Wimp and puts it in the variable reason% which the program uses to work out what it has to do. The other two variables, B% and mask% are also used.

B% holds the start address of the block of memory into which Wimp_Poll will put any extra information such as the co-ordinates of the window that needs updating or the number of the mouse button pressed. mask% is used to mask out any unwanted values of Wimp_Poll i.e. it stops Wimp_Poll returning certain reason codes. This speeds up the whole system – if a program doesn't need to know if a key has been pressed it masks out the key pressed code, otherwise keyboard response will be slowed down because the Wimp will inform the program of key presses, only to have them handed straight back.

Wimp_CloseDown

This is fairly straight-forward. It just informs the Wimp that its services are no longer required. If you need to perform any Wimp operations after a call to Wimp_CloseDown you must re-initialise the system first.

Necessary kit

Next month we will start on the !Evaluate application, so read the Application Notes and Introductory Chapter of the Wimp section in the PRM.

You really need the following items of kit:

• **FormEd**. FormEd is Acorn's Template Editor and is an essential tool for creating windows and icons. You can get FormEd from SID, Archive, the RISC User 2/10 disc, some BBS and PD distributors. *(We will be puting it on Shareware 19, hopefully, but please don't order it until you know it is available – it makes life very complicated for Alison when people order things that are not available. Thanks, Ed.)* Alternatively Acorn say that you can go down to your local dealer and ask them to down-load one for you – for a nominal fee of course.

• **The RISC-OS PRM.** This four-volume guide documents all the SWI calls you need to use to operate the Window Manager, and all the other modules too, so you can't write any sort of serious program without it. A similar set of manuals for the 400 Atari ST would cost upwards of £200 (well, according to Risc User anyway) so at £79.95 it's not that expensive. (£75 through Archive inc carriage.)

P.S. Try and get in some practice with FormEd – once you see how easy it is, you won't want to stop creating windows! A

TechnoScan Scanner

Jim Markland

Supplier: Technomatic Ltd, Techno House, Church Lane, London, NW9 8TQ, Tel 01–205–9558. Cost £149 + VAT & postage.

Supplied: Scanner head + Single width interface card + 43 page manual + Software on one disc (backupable!).

All the parts of the package arrived in a cardboard box with polystyrene centre, shaped to take all the items.

My first problem was in fitting the single-width interface card inside my 440 machine. The instructions are clear, with advice about taking anti-static precautions before touching the circuit board but I found that the back panel of the interface card protruded beyond the back of the computer by about 5 mm and I couldn't get the fixing screws into their respective holes. I cured this by removing the back panel of the interface card from its printed circuit board and elongating the slots in the fixing brackets so that the back panel was a bit nearer the PC board when re-assembled.

There is a yellow flying lead that must be connected to the 12 volt pin on the backplane. A second connection is provided for the wire that was on this pin. If you wish to use this scanner with an A3000 than an external power supply is required.

The Scanner head plugs into a socket of similar type to the one that the keyboard uses. It is supplied with a 6 foot cord, allowing use up to about 3 feet from the keyboard. It has four controls: (1) brightness control (2) resolution switch with 4 settings as follows:

Switch Position	Grey Scale Resolution	Scan Width
1	33 dpi	140 dots
2	67 dpi	280 dots
3	100 dpi	420 dots
4	133 dpi	560 dots

You can see that there is a play-off between resolution and width of scan.

(3) Scan mode. There is a "Letter" position for two colour scans and three "photo" positions. You need to experiment to find which one gives the best results for

the item you are trying to scan. (4) Scan start button. Press and hold this while you scan your document.

The software is supplied as a RISC-OS application and is fully multi-tasking. The scanner can be used while using a DTP package etc, provided you have enough memory. The scanner requires at least 256K but will grab 384K if enough memory is available. The length of the scan is related to how much memory is available up to a maximum of about 460 lines. The width is a maximum of 106 mm (about 4.2 inches).

When the application is installed, its icon (a small scanner) appears to the left (hardware) side of the icon bar. Clicking on this with <menu> produces a menu of Info, Save, Reset and Quit. These are self-explanatory except for the reset option. When selected, this resets the palette colours and scaling ratios.

Now down to work! To start a scan, click on the icon bar as above but with <select>. A window is opened labelled "TechnoSCAN". This is the window where your image will appear (unless you opt for it not to). When <menu> is clicked over this window a menu appears: Scan, Options, Clear, Edit, Save and Colours.

Scan starts a scan by turning on the light within the scanner head, turning the desktop border blue, and changing the pointer to an image of the working scanner. The scanner head is placed over the document to be scanned and the start button pressed. As the scanner is moved down over the document its image appears on the screen. If you move the scan head too fast, which causes distortion in the image, the border colour changes to red as a warning.

Options toggles Show, Bounded and Anti-Alias on or off. If Show is off, data is handled faster. Bounded allows the scan window to go off the screen or not. Anti-Alias, when selected, causes rescaled or edited scan images to use the system's anti-alias routines.

Clear clears the window after putting up a dialogue box asking if you're sure.

Edit takes you to a sub-menu where you can Zoom, Size, Flip-X, Flip-Y, Rescale and Cut your image. All scanned images are saved as sprites.

Save leads to a sub-menu where you can rename the image, save it or save the current palette.

Colours allow you to select the two colours used when in two colour mode and to edit the grey scale when using 16 level mode.

In use, it's a case of try, try and try again! It takes a lot of practice to get good results from this scanner. There's a good trouble shooting section in the manual to help you sort out any problems. I'm quite happy with it, but it's still early days yet!

(Any offers from other readers to give impressions of other scanners? Ed.) A

Archive Bulletin Board Report

Alan Glover

The Archive bulletin board which is now cele-brating its first anniversary has become increas-ingly busy over the past few months. We recently reached 16,000 calls and have over 1,000 users. This clearly makes Archive magazine and bulletin board one of the most important mediums for information exchange for Archimedes and A3000 users. As a result of this level of activity, we now have two Sysops – the new addition is Karen Dunkley, formerly of Beebug's Technical Support department.

Users who haven't called since August 1989 will find that they have been deleted from the user log – our apologies to those of you affected by this but with so many users it was necessary to speed up day-to-day operation of the bulletin board. Any messages from before November 1989 have also been deleted to free space on our hard disc.

In the light of this you may be glad to hear that a new (170M SCSI) hard disc is on the way to us and should actually be up and running by the time you read this!

Download material

The new hard disc will give us four times as much storage which will all be available for messages and software. Currently, we have approximately 36M of archived downloads (approximate size un-arced is 70M). Recent software uploaded to Archive, and available for you to download, includes a multi-tasking Bank Manager program by Kenneth Jolley, an invaluable desktop utility by Alan Glover *(hardly an impartial view!! Ed.)* and a variety of Serial Port style

demos including one from Phil Colmer and the Customer Support department at Acorn. Other general download areas include Graphics and Demos, MS-DOS and Games, and Comms and Utilities. In total there are ten download areas and twenty-one message areas.

The music area is closed at present – Phil Colmer of Acorn is making enquiries with the MCPS about the copyright position with regard to computer music. Further information will be published in the magazine and on the bulletin board when it becomes available. The situation in the past has been that other bulletin boards have had to restrict access to music files and charge users a fee to download the music file, with the fee being passed onto the owner of copyright for the music.

Future developments

At present we are having new software written for the board which will enable it to have three telephone lines, including one high speed line which will support MNP5 error correction. Unfortunately, the advent of the new software does mean that V23 users are no longer able to upload to us at 1200 baud. (It is unlikely that this little-used facility will return, as it is hardware dependent.)

Another advantage of using Archive BBS is that you can download the monthly magazine discs and the shareware discs. The Careware discs are also available via the bulletin board but please rem-ember to make a donation to a charity if you are taking advantage of this facility.

Technical help

If you don't think it worth spending £8 for Archive's Telephone Technical Help Service, technical questions can be put on the Archive bulletin board. As well as all the regular users, Phil Colmer from Acorn regularly logs on to answer users questions. Both sysops are also able to answer technical queries – by Archive mail rather than by paging please, or in the public message areas.

Other interests

Not all sections of the bulletin board are computer related – as well as an educational area, we have sections to enable you to contact other users, place free adverts, exchange views with other musically minded people. Our Debate section can get quite lively at times – some topics discussed recently include censorship and hacking. Actually, the debate section is one of the busiest areas on the bulletin board with a wide variety of both computer and non-computer related debates going on.

Another healthy section is the 'Rumours and other news' section which is used as an information exchange for new products on the way (maybe!) from software/hardware companies. Latest news on products for the Archimedes and A3000 are frequently included in this area.

PD software problems?

Due to the large amount of shareware for the Archimedes, there have been considerable problems with the use of filetypes, SWI chunks and error blocks. These are allocated by Acorn Computers to software houses to avoid clashes between software packages that use the same filetypes. Although problems can also be caused by the same SWI chunks and error blocks being used, the most noticeable problem for users will be the production of duplicate icons caused by two applications. As an example, imagine all your pictures from a !Art package being given an icon that was more suited to the !Spreadsheet application for which it was designed!

As a result of a suggestion made by a user of the Archive BBS, we are now managing a range of filetypes, SWI chunks and error blocks. By agreement with Acorn we will be allocating these on request, either through the Archive office or, preferably, through the Archive BBS. Requests for the allocation should either be sent to us on the BBS or to Paul Beverley at the Archive office who will pass the requests on to us. Requests should include the name of the application, your name and address, the number of the filetype.swi chunk or error block. For filetypes, the name of the filetype, as an example, the filetype DDC is also named archive. The name of the filetype can be up to eight characters in length.

Archive BBS can be contacted on 01 683 0629, V21-V22bis, scrolling. Please note that Reverse V23 is no longer supported. A

This month's password is 'Wedding' – I bet you can't guess why! Ed.

Artisan 2 Review

Malcolm Banthorpe

Artisan, introduced in late 1987 soon after the Archimedes 305 and 310 were launched, was the first significant graphics package to be made available for the machine. Although being confined to 16 colours (which meant that it was not capable of fully exploiting the graphics capabilities of the then current operating system, Arthur) it quickly established itself as a favourite. It says much for the original program design that it has remained popular despite the appearance of several rival packages offering more sophisticated facilities.

It has been particularly well received by schools and has been adopted by many Education Authorities as the standard art package. The reason for this popularity probably lies partly in its intuitive use of pop-up menus – something which is now well established but which was certainly not the norm on early Archimedes software – providing rapid access to all of its basic options and allowing new users speedily to gain a useful degree of competence in using it.

A year later ProArtisan, working with 256 colours and offering a number of more sophisticated facilities, became available but it has not so far achieved the same degree of popularity owing to its considerably higher price. This has recently been reduced to £99.95 (or £85 through Archive), making it more competitive with its rivals.

Artisan 2, an upgraded version of the original 16-colour Artisan, has been released. This is similar in appearance and operation to the original version but incorporates a number of enhanced features, some of which were first seen in ProArtisan. The first difference to be noticed is that it has been designed to run under RISC-OS rather than Arthur: clicking on the !Artisan application installs it on the icon bar. At least, it does eventually. You first have to convince the software that you are a legitimate user.

The form of copy protection employed on the disc is similar to that used with Interdictor, requiring you to enter correctly the colours of two randomly chosen squares from a grid at the front of the manual. In other words, the disc itself is not really copy-protected – you're free to make your own backup copies and to install it on a hard disc – but copies are unlikely to be usable by third parties. Like all forms of copy protection it's an irritation to the legitimate user. With an intuitive program like Artisan, the manual will generally not need to be consulted after the first few sessions and can be stored away, out of sight. This form of protection requires it, or at least the relevant page, to be on hand every time the program is loaded and if you lose the manual or someone borrows it, the software is unusable.

Once installed, the program is initiated in the familiar RISC-OS manner either by clicking on the icon or by dragging a suitable file – screen or sprite – onto it. The pop-up menus are identical in most aspects to those in the original Artisan with some additional options and with one major difference.

Originally the menus would disappear as soon as the pointer left the window, sometimes causing the menu to be removed unintentionally if the pointer was accidentally moved beyond the window boundary. This aspect was one (probably the only) major criticism of Artisan. The menus now stay on the screen until the selected operation is started. But should you wish, for instance, to draw on the part of the screen obscured by the menu then it is obviously not possible to start the operation and the menu must be removed first by pressing <adjust>. Whether this is more or less annoying than the previous elusive menus will be a matter for individual users to decide. Perhaps it would have been better to stick to the more common convention of removing the menu as soon as an option is selected.

As mentioned above, several of the new options first appeared in ProArtisan. One such feature is the Global Magic Brush. As you may recall, Magic Brush allows a selected set of colours to be changed to another set of colours simply by passing the brush over the required area of the screen. This works fine until you try, for instance, to change red in the original picture to blue and blue to green and green to red. This circular relationship of the colour changes is likely to lead to unpredictable results when the normal Magic Brush option is used. Global Magic Brush rectifies the situation by allowing the colour changes to be applied to a selected rectangle. A single change is then applied to each pixel. As well as being quicker when dealing with large areas, the above problem is avoided.

The fill option now opens a sub-menu offering a number of graduated fills. While obviously not as effective with a 16 colour palette as with 256, some useful effects can be achieved. Dithering can optionally be applied to smooth out the boundaries between adjacent colours. If you particularly wanted to achieve, say, a smooth graduated fill in yellow, then four or more colours in the palette could be redefined as shades of yellow.

Sprite handling, in line with the facilities offered in RISC-OS, is now more versatile allowing sprites to be scaled to any proportions.

Cutting and pasting irregular shapes is made easier as it is now only necessary to draw round the shape in the masking colour and then define the rectangle containing the sprite, rather than having to paint out each of the background pixels.

While on the subject of masking, it is now possible to select more than one colour as transparent. This facility is used with the new airbrush option to determine which colours can be sprayed onto. In this way irregular shapes can be sprayed with no danger of the spray going beyond the boundary.

A feature entirely new to Artisan is the ability to produce colour separations for use in various printing processes. There are two main options offered. The first generates four monochrome sprites representing the cyan, magenta, yellow and black components of the picture. The second allows any colour or group of colours from the 16-colour palette to be isolated for the purpose of generating a monochrome sprite. In each case the sprites produced will be larger then the screen as they contain registration marks to help with alignment during printing. Printing will generally be done using !Paint and your usual RISC-OS printer driver.

Another new feature is a form of pattern generation aimed particularly at textile design. The screen is filled with copies of the the current sprite either at its original size or scaled to a grid. The way that the sprites are arranged is determined by selecting either no drop, half drop and full drop options and adjacent sprites can be flipped in the X and/or Y directions. Altogether quite a versatile tool for generating patterns of this type.

With school use particularly in mind, the disc may be configured so that specific menus or individual options can be disabled.

Like previous Clares' manuals the one that accompanies Artisan 2 is difficult to fault and for the benefit of new users has, throughout the text, a series of 15 exercises in various aspects of the program to help develop familiarity.

With Artisan's previous track record, this new version is almost certain to be a success, particularly in schools. At £59.95 (£55 through Archive) it represents reasonable value for money. The upgrade price of £30 (£28 through Archive) may however prove too high to tempt many existing users, unless they have a particular need for the new facilities. Both they and some potential new users may be more attracted to a 256 colour paint program, even if it does mean spending a bit more money. A

Music on the Archimedes

Jim Markland

In this, the final article in a short series which looks at various aspects of programming the Archimedes, we look at Music... but first let's take on board one very important concept which is that, in order to develop an 'optimal' solution to any problem, it is necessary to understand fully the whole problem.

In other words, there are horses for courses. Map out the course improperly and you risk backing the wrong horse. (This applies particularly to program architecture and involves the tools, the programmer and the end user.) Furthermore, no matter how hard one may seek to find and develop beauty in structure and form, there are few, if any, perfect solutions but many compromises. These thoughts we will return to later. In the meantime, the matter to hand is to establish one man's view of computer music.

Computer music

Despite a propensity for producing annoying digital noise, the Archimedes, when used to drive a decent stereo, can generate quite acceptable sound and its ability to drive eight independent channels gives the user considerable scope.

!Maestro, a relatively straight forward and none too difficult-to-use music editor, is in the house of every Archimedes owner and, as mentioned in Archive 2.10

(p 15), offers the ability to interface with external MIDI instruments, providing suitable additional hardware is installed.

Short of noting that there appears to be a paucity of readily available information on the relative merits of various Archimedes / podule / MIDI instrument combinations, rendering the prospective purchaser a veritable hostage to fortune, we will consider this aspect of computer music no further for the moment. In contrast, we focus on what can be done on the Archimedes alone and, in particular, how one can make the most of its music facilities for low financial outlay. (I make no apology for continuing, yet again, on this theme. It really does provide a common denominator upon which to build. Is this not why BASIC proved so successful?)

Music on the cheap?

For the less musically inclined, there are several Archive Shareware disks which make a variety of musical pieces available for playback. These may, if appropriate, be readily enhanced if further sounds are available, over and above those provided by Acorn. One suitable source for these is EMR who produce a useful range of the same. *(There will be some coming out on Sharteware too, at some stage. Ed.)*

An alternative source is Ronald Alpiar's Eucorn package. (Archive 2.12 p 50) In addition to presenting some splendid pieces in an unusual way, Eucorn contains a number of relocatable sound modules which, when installed, can also be used with !Maestro.

Eucorn invites the user to enter his own tunes, although the system for this demands familiarity and there are advantages in making the first plunge into computer music with the conventional musical notation of !Maestro. The latter, which runs to many, many lines of code, works very well although is occasionally capable of becoming slightly confused. There is, however, one particular additional feature we would dearly like to have, which is the facility to manipulate blocks of notes, as in a wordprocessor (i.e copy, move, delete). This, with an additional capability for simultaneous transposition, and possibly programmed repetition, would significantly reduce the pain of setting up, say, lengthy 12-bar blues or chord accompaniments.

Having expanded your collection of voices, patiently written and even conducted (with Eucorn) your own pieces, what can there possibly be left to do?

Enter the programmer

Music, at least Western Music, can be highly structured and not always in obvious ways. It is the study and manipulation of these structures which appeals. All that is needed to explore this is an enquiring mind and some mathematical ability. There is, however, one impediment. Once again, as with other Acorn file formats, no doubt, for good reasons, !Maestro files – in the absence of any documentation – do not appear particularly easy to create independently or to modify in any meaningful way using !Edit. A simple vehicle for producing !Maestro files automatically could help enormously. *(Any offers, anyone? Ed.)*

My interest in computer music began some years ago and was re-awakened when on a Geostatistics (the study of spatially dependent variables) course in Geneva. The recognition that musical forms could possibly be described using a variogram were greeted with muffled squeals of delight. Subsequently, greater fulfillment lay in store when reading Voss's accounts of his analyses of, and attempts to create, music by computer. His astonishing result that virtually all music shares a similar broad inverse linear relationship between spectral density and frequency is fascinating. This he calls 1/f music and the relationship can be explored using the Fast Fourier Transform.

Music, too, has fractal dimensions!

Voss gives examples of synthesised white noise (random), 1/f music and brown noise (highly correlated) for you to try.

In another vein, an account of a recent New York APL conference (Vector, October 1989), records very impressive simulations, by one Stanley Wilson, based upon Markov Chains – sufficient to impress no less than the ghost of J.S.B. himself.

So there are opportunities for the programmed creation of your own music – in principle, at any rate.

Real music, of course, comprises more than just loosely correlated progressions of notes generated by the throw of the dice and it is clearly insufficient to define a piece just by its spectral density or as one simple Markov process. You may wish to include, for example, repetitive chord progressions and rhythms. In fact the scales, chords and chord progressions used in jazz merit study in their own right. There is great scope for emulating jazz improvisation and exploring chord substitutions.

(For those in the know, if you are undertaking any serious simulations, do think about the proper conditioning of the same.)

Understanding the structure

Now hark back to the opening comments. The structure of the music you may choose to simulate does need to be understood in some detail in order for there to be any hope of achieving the desired effects and compromises there will be. In the event, it all may prove too difficult. It's up to you. Never-the-less, you will find that there is scope for lots of fun without that MIDI interface.

Now, all the above are not a castigation of the MIDI concept. Indeed, at the end of the day you may prefer to use the facilities offered by a MIDI keyboard for entering long pieces into the computer. It does appear, though, that finding the right combination of MIDI equipment can be a minefield. Hopefully this is only an awareness problem which the suppliers can resolve. (The keyboard market is, after all, dominated by relatively few products.)

If you have not yet purchased any MIDI equipment, do think what it is you want it for and what software you will need for the purpose. Do try to research the options carefully and do recognise that there may not be a perfect solution to fit every budget.

[1] ref Voss.R.F 1985 "Random Fractal Forgeries" Proc. NATO A.S.I. on Fundamental Algorithms in Computer Graphics, Ilkley, Yorks

[2] Vector is the quarterly magazine of the British APL Association c/o Alison Chatterton, 9 Oak Grove, Hertford, SG13 8AT. A

I hope you understood that! It was a bit over my head!

By the way, did I dream it or did someone offer to run a music column in Archive? If so, what happened? I can't find anything in my 'offers of help' book. Ed.

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